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A. PACK
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INTRODUCTION

The function of the AUTOMATIC LOAD and DUMP (ALD) is to load 8092B core from magnetic tape or dump 8092B core to a magnetic tape.

When programs or files are being transferred from magnetic tape and 8092B core, the transferring of the words is done by banks and will always start with the word zero of bank zero. The banks will be in consecutive order until either the end of file mark is detected from the magnetic tape, or the last bank (which was indicated for the dumping of the 8092B core) has been reached. The transfer shall not exceed 14 banks of core.

ALD will have the following capabilities:

1. Set up a library of programs or files on the magnetic tapes. Up to 15 files (17 octal) may be recorded on one magnetic tape.
2. Update specific programs or files on the magnetic tape.
3. Add new programs or files to the magnetic tape.
4. Call specific programs or files to be loaded into 8092B core from the magnetic tape.
5. Verify the accuracy of transfers between the magnetic tape and 8092B core.

1. Boot Strap

The first file on tape is the boot strap, which has three records.

A. Record one, BOOTAH and BOOTA

B. Record two, BOOTBH and BOOTB

C. Record three, BOOTCH and BOOTC

1.0 BOOT STRAP

A. BOOTAH, BOOTA

The first 45 frames of this record are 6 bit words making up program BOOTAH. The remaining frames of this record are 4-bit words. When loaded into core this record has the following capability:

The first 45 locations become a program of 6-bit instructions which when executed, assembles an 8-bit program called BOOTA. BOOTA is then executed and assembles the balance of the record, (which are programs COPY and CALL) and stores them in bank 13 starting with word zero.

B. BOOTBH, BOOTB

The first 45 frames of this record are 6-bit words making up program BOOTBH. The remaining frames of this record are 4-bit words. When loaded into core this record has the following capability:

The first 45 locations become a program of 6-bit instructions which when executed, assembles an 8-bit program called BOOTB. BOOTB is then executed and assembles the balance of the record, (which are programs SET and MTLD) and stores them in bank 14 starting with word zero.

C. BOOTCH, BOOTC

The first 45 frames of this record are 6-bit words making up program BOOTCH. The remaining frames of this record are 4-bit words. When loaded into core this record has the following capability:

The first 45 locations become a program of 6-bit instructions which when executed, assembles an 8-bit program called BOOTC. BOOTC is then executed and assembles the balance of the record, (which are programs LPFT and DPTT) and stores them in bank 15 starting with word zero.

2. Program

The following descriptions are for the programs which run in the 8090, or the 160A computer:

A. PACK

This program will generate the boot strap for the Automatic Load and Dump Tape for the 8092 Computer.

Its function is to write three magnetic tape records, end of file mark and code mark (octal 77) in binary and low density. It checks for errors after each record.

The records in this file are:

Record 1 = BOOTAH and BOOTA
Record 2 = BOOTBH and BOOTB
Record 3 = BOOTCH and BOOTC

B. NEW

Its function is to add a <u>new</u> file onto the "Magnetic Automatic Load and Dump Tape".

When programs for the 8092B Teleprogrammer have been assembled by OSAS-A, the binary paper tape output may be loaded into the 8090 or the 160A computer, transferred to the "Magnetic Automatic Load and Dump Tape". The routine will assign a file number to show the file location on the "Magnetic Automatic Load and Dump Tape".

Continuation

These are the programs which run in the 8092B Teleprogrammer

C. COPY

This program copies the first file from AUTOMATIC LOAD and DUMP TAPE. This file is the BOOT STRAP. (The BOOT STRAP is not considered as a file number on this tape.) There are three records to this file.

Record 1 is known as BOOTAH and BOOTA
Record 2 is known as BOOTBH and BOOTB
Record 3 is known as BOOTCH and BOOTC

COPY can output records 1, 2, and 3 on the new tape, write end of file mark, and code mark (an octal 77) which identifies the last file on the AUTOMATIC LOAD and DUMP TAPE.

D. CALL

This program loads the 8092B core starting with word zero of bank zero with the remaining two records of the BOOT STRAP file.

Record one of this file is loaded by the Teleprogrammers load and run switches. When record one is assembled program CALL is stored into bank 13.

CALL will then load 8092B core with record two of the file. Record two is then assembled and stores its programs in bank 14. Record three of the file is then loaded, assembled, and stores its programs in bank 15. CALL then comes to a halt.

Programs are now loaded in their proper banks and ready to perform any job assignment such as:

Dumping 8092B core to the Automatic Load and Dump Tape.
Loading 8092B core from Automatic Load and Dump Tape.
Copying the Boot Strap from the Automatic Load and Dump Tape on a <u>new</u> Automatic Load and Dump Tape.

E. SET

This program checks for the job assignment. If the job assignment is dumping SET will: a) determine if file to be dumped updates an existing

file and set up the number of the file to be updated b) determine if the file to be dumped is a new file to be added to the tape.

If the job assignment is loading, SET will determine the number of the file on magnetic tape to be loaded. SET will initialize all control words, fix program MTLD to either read or write, and exit to programs LPFT or DPTT depending on the job assignment.

F. MTLD

This program will read or write in binary and low density variable length records up to 102 characters over the normal channel. The characters are read into or written from a common input/output area. It checks for parity errors after each record transfer, if an error exists, it will try five times for that record. If the error persists MTLD will come to a halt to indicate the error. When dumping 8092B core on the Automatic Load and Dump Tape the file number will be displayed after completion of the dump in the A register.

When loading a file from the Automatic Load and Dump Tape into the 8092B core, MTLD will compare check sums for the verification of the loading. When complete file is loaded MTLD will come to a halt. The contents of the A register will display the following:

Zero in the A register, the file was loaded correctly
Non Zero in the A register, the file was loaded incorrectly.

G. DPTT

This program prepares the 8092B core for output to the Automatic Load and Dump Tape starting with word zero of bank zero.

Each word to be outputted is added to a check sum counter and then processed as follows:

The word is divided into two 4-bit words with the high order 4-bits being identified. The two 4-bit words are then stored into the input/output area. When the input/output area has reached 102 words, DPTT releases control to MTLD.

Continuation

After processing the last word, the check sum is processed in the same manner. The check sum then becomes the last two words of this record, which will be less than 102 words.

H. LPFT

This program assembles the words in the input/output area which were inputted by the Program MTLD from the Automatic Load and Dump Tape.

The input/output area is filled with 4-bit words.

Two 4-bit words are combined to one eight bit word, checksummed, then stored in 8092B core starting with word zero of bank zero, the store address is then incremented by one. When the storing is completed, LPFT releases control to MTLD. This process will continue until MTLD detects an end of file mark on the Automatic Load and Dump Tape.

OPERATIONAL SPECIFICATION

MAGNETIC "AUTOMATIC LOAD AND DUMP TAPE"

FOR THE

8090 OR THE 160-A COMPUTER

INDEX

1. HARDWARE REQUIRED

2. RESTRICTIONS

3. GENERATE A MAGNETIC "AUTOMATIC LOAD AND DUMP TAPE"

4. ADD A FILE TO THE MAGNETIC "AUTOMATIC LOAD AND DUMP TAPE".

I. HARDWARE REQUIRED

A. The 8090 computer with a 603 Tape Drive using the 8071 synchronizer, or the 160A computer with a 603 Tape Drive using the 162 synchronizer.

2. RESTRICTIONS

A. When a new file is to be added to the magnetic "Automatic Load and Dump Tape", the starting point for the output will always be memory location zero, and will be by multiples of 400 memory locations.

B. The dumping of the new file should not exceed memory location (7000).

3. GENERATE A MAGNETIC "AUTOMATIC LOAD AND DUMP TAPE"

a. Mount the magnetic tape that is to be an "Automatic Load and Dump Tape" on tape drive 3. Set tape drive 3 to LOW DENSITY and in a ready state with the magnetic tape at LOAD point.

b. MASTER CLEAR computer, and ZERO out memory locations.

c. Turn the paper tape reader on, set to read in 7 level paper tape. Put the paper tape that is marked "PACK" into the paper tape reader. Enter manually "~~7300~~ 7270" in the P-REGISTER. Put the LOAD switch into the up position, then the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7715, A = 0000, Z = 0000

Return the RUN and LOAD switches to the normal (center) position.

d. MASTER CLEAR computer

Enter, manually "~~7300~~ 7270" in the P-REGISTER. Put the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7543, A = 0060, Z = 7700

Return the RUN switch to the normal (center) position.

e. MASTER CLEAR computer

Enter, manually "~~7300~~ 7270" in the P-REGISTER. Put the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7543, A = 0000, Z = 7700

Return the RUN switch to the normal (center) position.

f. MASTER CLEAR computer.

Entry, manually "7000" in the P-REGISTER. Put the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7244, A = _____, Z = 7700

Return the RUN switch to the normal (center) position.

g. The magnetic tape on tape 3 is now a magnetic "Automatic Load and Dump Tape". The only file on the tape is the BOOT-STRAP, which is a self storing program.

h. ERROR STOPS

Return the RUN switch to the normal (center) position.

1. P = 7116, A = 0002, Z = 7700

REASON: Tape Drive 3 is not ready.

RECOVERY: Correct the condition of tape drive 3. Put the RUN switch into the up position.

2. P = 7160, A = 7777, Z = 7700

REASON: Parity error detected on five successive attempts to write.

RECOVERY: Restart with step 3a (above), and use a different magnetic tape in step 3a.

I. If the computer stops and none of the error stops described above appear, restart beginning at step 3a (above).

4. ADD A FILE TO THE MAGNETIC "AUTOMATIC LOAD AND DUMP TAPE".

a. Mount the magnetic "Automatic Load and Dump Tape" on tape drive 3. Set tape drive 3 to LOW DENSITY and in a ready state with the magnetic tape at LOAD point.

b. MASTER CLEAR computer, and ZERO out memory locations.

c. Turn the paper tape reader on, set to read in 7 level paper tape. Put the paper tape that is marked NEW into the paper tape reader. Enter, manually "~~7300~~ 7270" in the P-REGISTER. Put the LOAD switch into the up position, then the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7715, A = 0000, Z = 0000

Return the LOAD and RUN switches to the normal (center) position.

d. MASTER CLEAR computer

Enter, manually "~~7300~~ 7270" in the P-REGISTER. Put the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7543, A = 0000, Z = 77000

Return the RUN switch to the normal (center) position.

e. Remove the paper tape (NEW) from the paper tape reader. Insert the binary paper tape which was created by the OSAS-A assembly in the paper tape reader. Enter, manually "~~7300~~ 7270" in the P-REGISTER. Put the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTERS:

P = 7543, A = 0000, Z = 7700

Return the RUN switch to the normal (center) position.

f. Enter, manually "7000" in the P-REGISTER. Enter manually the last address to be dumped on the magnetic tape into the A-REGISTER.

NOTE: The first word to be dumped is memory location zero. Put the RUN switch into the up position. The computer will come to a halt with the following information in the REGISTER:

P = 7266, A = FILE-NUMBER, Z = 0003

Return the RUN switch to the normal (center) position.

The A-REGISTER will then contain the file number for the file just dumped on the "Automatic Load and Dump Tape".

G. ERROR STOPS

Return the RUN switch to the normal (center) position.

1. P = 7014, A = 0077 ~ 0000, Z = 7700

   REASON: If the A-REGISTER equals "0077", the program to be added is too large (exceeds 7000) for dumping. If the A-REGISTER equals "0000", the last memory address location for dumping was not entered.

   RECOVERY: A-REGISTER equals (0077). NONE
   A-REGISTER equals (0000). Enter, manually the last memory address location for dumping. Put the RUN switch into the up position.

2. P = 7055, A = 0002, Z = 7700
   P = 7203, A = 0002, Z = 7700
   P = 7226, A = 0002, Z = 7700

   REASON: Tape unit 3 is not ready.

   RECOVERY: Correct the conditions of tape unit 3, put the RUN switch into the up position.

3. P = 7102, A = 0020, Z = 7700

   REASON: The "Automatic Load and Dump Tape" already has 17 octal files recorded.

   RECOVERY: Restart with step 4a (above) and use a different Automatic Load and Dump Tape in step 4a (above).

4. P = 7037, A = 0006, Z = 7700

   REASON: Parity error detected on five successive attempts to write.

   RECOVERY: Restart with step 4a (above) and use a different "Automatic Load and Dump Tape" in step 4a (above).

H. If the computer stops and none of the error stops described above appear, restart beginning at step 4a (above).

OPERATIONAL SPECIFICATION

MAGNETIC AUTOMATIC LOAD AND DUMP TAPE

FOR THE

8092B TELEPROGRAMMER

INDEX

1. Hardware Required
2. Restrictions
3. Generating a new Magnetic Automatic Load and Dump Tape "BOOT STRAP ONLY"
4. Loading a program or file from the Magnetic Load and Dump Tape to the 8092B Core
5. Dumping a program or file from the 8092B Core to the Magnetic Automatic Load and Dump Tape.

1. Hardware Required

   a. One 8092B Teleprogrammer

   b. 601 Magnetic Tape Drive with a 8193 synchronizer or,
      603 Magnetic Tape Drive with a 8093B synchronizer

2. Restrictions

   a. When a program or file is to be transferred from the Magnetic Automatic Load and Dump Tape, and 8092B core, the following will always be true:

      1. They start with word zero of bank zero
      2. The transferring is done by banks
      3. The banks are in consecutive order
      4. The maximum bank is bank 14

   b. The Magnetic Automatic Load and Dump Tape shall not exceed 15 (17 octal) files

   c. When a specific program or file is to be updated, the file size must not be altered

3. Generating a new "Magnetic Automatic Load and Dump Tape" (BOOTSTRAP ONLY).

a. Mount the "Magnetic Automatic Load and Dump Tape" on tape drive 3. Set tape drive 3 to a ready state with the magnetic tape at load point.

b. Master Clear 8092B computer

Put the LOAD switch into the up position, then the RUN switch into the up position. One record will be read from the magnetic tape on tape drive 3. The computer will come to a halt with the following information in the registers

P = 1401 OR 1403, A = 377, Z = 0.

Return the LOAD and RUN switches to the normal (center) position.

c. MASTER CLEAR 8092B Computer

Put the RUN switch into the up position. Computer will come to a halt with the following information in the registers.

P = 6716, A = 0, Z = 077.

Return the RUN switch to the normal (center) position.

d. Enter, manually "360" in the A-REGISTER.

Put the RUN switch into the up position. Computer will come to a halt with the following information in the registers

P = 6561, A = 377, Z = 077

Return the RUN switch to the normal (center) position.

e. Mount the magnetic tape that is to be the new "Magnetic Automatic Load and Dump Tape" on tape drive 3.

Put the RUN switch into the up position. Computer will come to a halt with the following information in the registers.

P = 6605, A = 0, Z = 077

Return the RUN switch to the normal (center) position.

f. The magnetic tape on tape drive 3 is now a "Magnetic Automatic Load and Dump Tape". The only file on the tape is the BOOT STRAP, which is a self storing program.

g. ERROR STOPS

Return the RUN switch to normal (center) position.

1. P = 6421, A = 002, Z = 077
   Tape drive 3 is not in ready state. Correct the condition and put the RUN switch into the up position.

2. P = 6510, A = 000, Z = 077
   Parity error detected on five successive attempts to read or write

   a. If error occurs on read, the automatic load and dump tape may be bad. In this case a different load and dump tape must be used in setp 3a (above).

   b. If error occurs on write, restart from Step 3a, and use a different tape in Steps 3c (above).

h. If the computer stops and none of the error stops described above appear, restart beginning at step 3a, above.

4. LOADING A PROGRAM OR FILE FROM THE "MAGNETIC AUTOMATIC LOAD AND DUMP TAPE" INTO THE 8092B CORE.

a. Mount the "Magnetic Automatic Loand and Dump Tape" on tape drive 3. Set tape drive 3 to a ready state with the magnetic tape at load point.
Master Clear 8092B computer
Put the LOAD switch into the up position, then the RUN switch into the up position. One record will be read from the nagnetic tape on tape drive 3. The computer will come to a halt with the following information in the registers

P = 1401 OR 1403, A = 3577, Z = 000.

Return both the LOAD and RUN switches to the normal (center) position.

b. MASTER CLEAR 8092B COMPUTER
Put the RUN switch into the up position. The computer will come to a halt with the following information in the registers.

P = 6716, A = 0, Z = 077

Return the RUN switch to the normal (center) position.

c. Enter into the "A-REGISTER" the file number that is to be loaded in the lower 4-bits of the A-REGISTER.

NOTE:

A-REGISTER

Bits	3	2	1	0
	F	I	L	E

not used for loading a file — File Number

If files 1 to 7 are to be called, enter the A-REGISTER with that specific file number. If files 8 to 15 are to be called, enter the A-REGISTER with that specific file number in OCTAL.

Put the RUN switch into the up position. When the computer halts, the file which was specific is now stored into the 8092B core. The registers are as follows:

P = 7361, A = ZERO / NON-ZERO, Z = 077.

If the A-REGISTER is other than zero, the file specified was not loaded correctly. Restart with step 4a.

If the A-REGISTER equal to zero, the file specified was loaded correctly.

d. ERROR STOPS

Return the RUN switch to the normal (center) position.

1. P = 7003, A = 000, Z = 077.

REASON: No assignment job was specified.

RECOVERY: Enter the job assignment into the A-REGISTER.
Put the RUN switch into the up position.

2. P = 7102, A = 002, Z = 077.

REASON: Tape drive unit 3 was not ready.

RECOVERY: Correct the condition of the tape drive
Put the RUN switch into the up position.

3. P = 7203, A = 000, Z = 077

REASON: File requested from the (ALD) does not exist.

RECOVERY: None

4. P = 7275, A = 022, Z = 077

REASON: Parity error detected on five successive attempts to read or write

RECOVERY: None. Restart from step 4a (above) and use a different (ALD) tape

5. P = 7372, A = 377, Z = 077

REASON: The program or file which was to be dumped on the ALD tape exceeds bank 14.

RECOVERY: None (program is too large for dumping)

6. P = 7656, A = 000, Z = 077

REASON: File requested from the ALD does not exist

RECOVERY: None

If the computer stops and none of the error stops described above appear, restart beginning at step 4a (above).

5. DUMPING A PROGRAM OR FILE FROM THE NAGNETIC AUTOMATIC LOAD AND DUMP TAPE (ALD)

a. The routines that execute the 8092B core dump are stored in banks 14 and 15 (octal 16 and 17). If a program is to be dumped after execution, it cannot use banks 14 or 15 since to do so, would destroy the dump routine.

b. When a specific file on the ALD is to be altered and the revised file does not alter the previous file size it may return to the ALD under the same file number. If the revision does alter the previous file size, it must be dumped as a new file on the ALD.

INSTRUCTIONS FOR DUMPING TO THE ALD

c. Mount the ALD tape (on which the file is to be recorded) on tape drive 3. Set the tape drive to a ready state with the ALD at load point.

MASTER CLEAR THE 8092B Computer

SET TAG2 to bank 14 (16 octal)
SET TAG3 to bank 15 (17 octal)
SET THE P-REGISTER TO 7001.

d. Enter in the A-REGISTER the total number of banks to be dumped. If the dump is to be an updating of the ALD as the same file, then enter the file number also in the A-REGISTER. If the file is to be added to the ALD leave the A-REGISTER file indicator bits blank.

A-REGISTER

Bit Positions 7 6 5 4 3 2 1 0 of the A-REGISTER
Bit Positions 3 2 1 0 3 2 1 0 of the indicators.
B A N K F I L E
Bank Indicator File Indicator

Put the RUN switch into the up position. The computer will come to a halt

with the following information in the registers.

P = 7352, A = FILE NUMBER, Z = 77.

Return the RUN switch to the normal (center) position.

e. The A-REGISTER will then contain the file number (for the file just dumped) on the ALD.

f. ERROR STOPS

Return the RUN switch to the normal (center) position.

1. P = 7003, A = 0, Z = 77

REASON: No assignment job was specified

RECOVERY: Enter the job assignment into the A-REGISTER.
Put the RUN switch into the up position

2. P = 7102, A = 2, Z = 77

REASON: Tape drive unit 3 was not ready

RECOVERY: Correct the condition of the tape drive.
Put the RUN switch into the up position.

3. P = 7203, A = 0, Z = 77

REASON: File requested from the ALD does not exist

RECOVERY: None

4. P = 7275, A = 22, Z = 77

REASON: Parity error detected on five successive attempts to read or write

RECOVERY: None. Restart from step 5c above and use a differet ALD tape

5. P = 7372, A = 377, Z = 77

REASON: The program or file which was to be dumped on the ALD tape exceeds bank 14.

RECOVERY: None. (Program is too large for dumping.)

6. P = 7656, A = 0, Z = 77

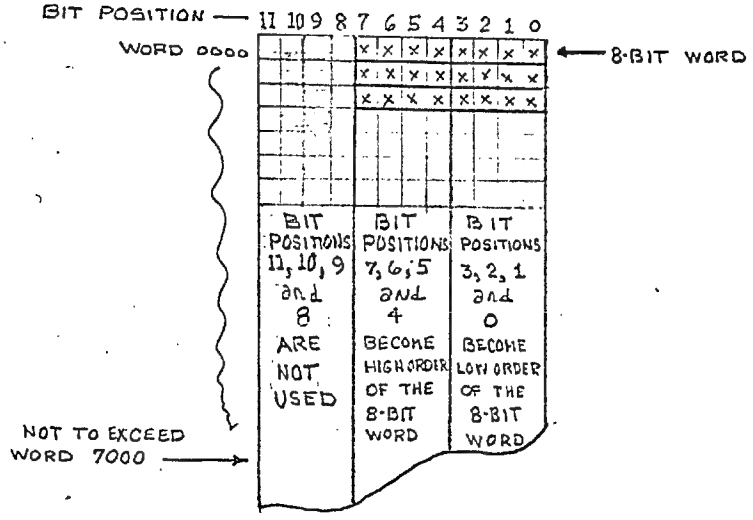
REASON: File requested from the ALD does not exist

RECOVERY: None

g. If the computer stops and none of the error stops described above appear, restart beginning at step 5c, above.

PROGRAM NEW FORMAT

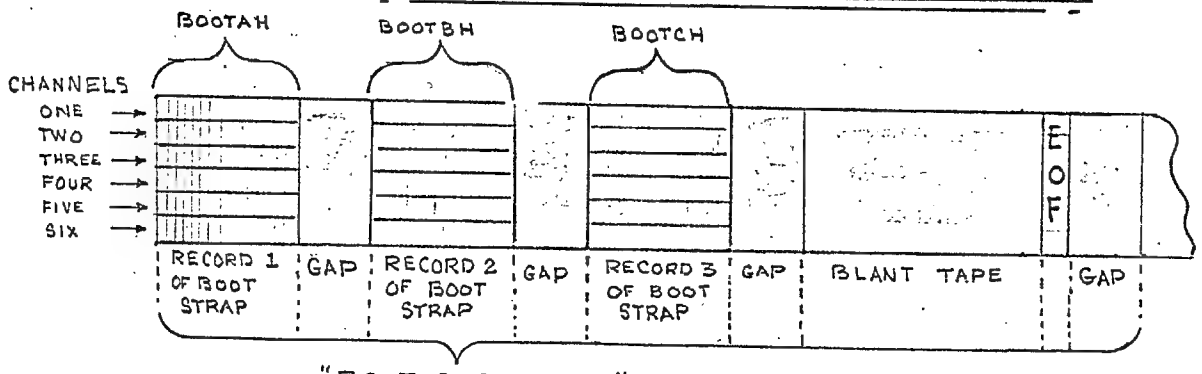
8090 OR 160A COMPUTER MEMORY



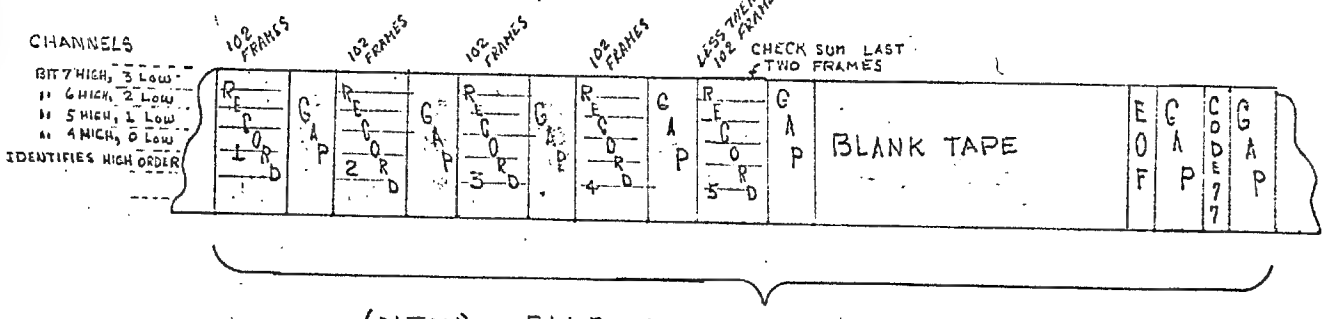
IT TAKES THE 8-BIT WORD DIVIDES THEM INTO TWO 4-BIT WORDS, THE HIGH ORDER BEING SHIFTED TO BITS 3, 2, 1 AND 0, BIT 4 IS ADDED TO IDENTIFIE HIGH ORDER BITS OF THE 8-BIT WORD.

THEY ARE OUTPUTED AS A NEW FILE ON THE MAGNETIC "AUTOMATIC LOAD AND DUMP TAPE" AS 102 FRAMES PER RECORD. THE LAST RECORD OF THE FILE, IS LESS THEN 102 FRAMES. THE LAST TWO FRAMES CARRY THE CHECKSUM OF THE 8-BIT WORDS IN THAT RECORD.

MAGNETIC "AUTOMATIC LOAD and DUMP TAPE"



"BOOT STRAP FILE"



(NEW) → FILE ADDED TO MAGNETIC TAPE

N Nicholas

NEW

I. Function

A. General

Program NEW is executed by the 8090 or the 160A Computer. After a program is assembled by OSAS-A for usage with the 8092B computer (Teleprogrammer). It maybe added onto the magnetic "Automatic Load and Dump Tape" and recorded as a specific file for further use with the 8092B Computer.

B. Detail

The binary output paper tape from the OSAS-A assembly of a program, can be loaded with the binary loader into the 8090 or the 160A computer. Program NEW will take each output word and save the lower 8-bits of that word, it will checksum that word and divide it into two 4-bit words. Each 4-bit word is placed in the low order of the output word. NEW identifies the high order 4-bits of the 8-bit word by adding bit position four. It searches the magnetic "Automatic Load and Dump Tape" for the last file, and it then will output the 4-bit words onto the magnetic "Automatic Load and Dump Tape" in record lengths of 102 characters. The last record to be in this file will carry the checksum of the 8-bit words in the last two frames. It will display a number in the A-REGISTER indicating the location of file on the magnetic "Automatic Load and Dump Tape".

II. CONTROL WORDS

NEWA	The last word address of the 8-bit words to be outputted.
NEWB	Checksum of each 8-bit word before storing for output.
NEWC	Programs file number on the (ALD) that was just outputted.
NEWD	Storage of the 8-bit word while being processed.
NEWG	Switch test to indicate the last record for the file being outputted.
NEWH	Last word address of the record for writing on magnetic tape.
NEWF	The start address for the 102 characters to be outputted.

III. ENTRY POINT

NEW

IV. EXIT

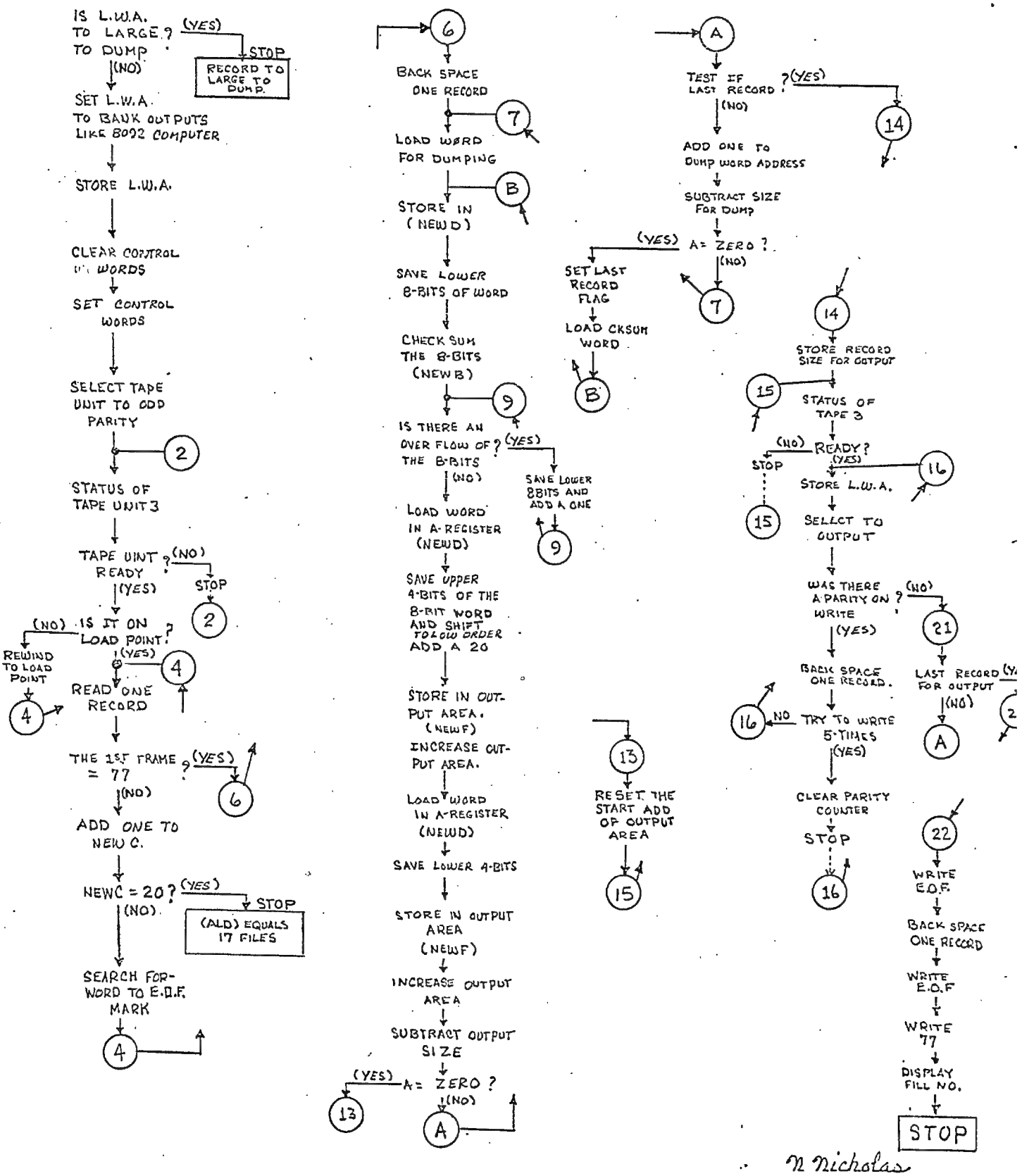
NONE

PROGRAM NAME
NEW

OUTPUTS NEW FILE ON (ALD) FROM 8090 OR 160A COMPUTER TO A 603 TAPE DRIVE.

PROGRAMS CONROL WORDS

- NEWA — LAST WORD ADDRESS FOR DUMPING
- NEWB — CHECKSUM OF EACH 8-BIT WORD BEFORE STORING
- NEWC — PROGRAMS FILE NUMBER ON THE (ALD) TAPE
- NEWD — PROCESSING OF THE 8-BIT WORD.
- NEWG — SWITCH FOR LAST RECORD TO BE DUMPED
- NEWH — LAST WORD ADDRESS FOR THE SIZE OF THE RECORD
- NEWF — OUTPUT AREA 102 CHARACTER.



N Nicholas

```
        7000            ORG             7000

                                                    ******************
                                                ****                  ***
                                                *   PROGRAM NAME *NEW*  *
                                                *                       *
                                                *  ADD A NEW PROGRAM ON *
                                                *   THE MAGNETIC AUTO-  *
                                                *  MATIC LOAD AND DUMP  *
                                                *        TAPE           *
                                                ****                  ***
                                                    ******************

        7000            PRG             7000
        0000            BNKO
7000    4257    NEW     STF     NEWA
7001    6012            ZJF     NEW1    -2
7002    6213            PJF     NEW1
7003    1200            LPC             7400
7004    7400
7005    0111            LS6
7006    4203            STF             3
7007    0470            LDN             70
7010    3600                            3600
7011    0000                            0
7012    6203            PJF     NEW1
7013    0477            LDN             77
7014    7700            HLT                     ** PROGRAM IS TO LARGE TO DUMP.
7015    0400    NEW1    LDN             0       ** CLEAR CONTROL WORDS.
7016    4265            STF     NEWB
7017    4267            STF     NEWG
7020    4264            STF     NEWC
7021    4273            STF     NEW7    1
7022    2200            LDC     NEWF
7023    7270
7024    4100            STM     NEW11   1
7025    7141
7026    3200            ADC             102
7027    0102
7030    4257            STF     NEWH
7031    2226            LDF     NEWA
7032    1200            LPC             377
7033    0377
7034    6007            ZJF     NEW2
7035    2222            LDF     NEWA
7036    3200            ADC             400
7037    0400
7040    1200            LPC             7400
7041    7400
7042    4215            STF     NEWA
```

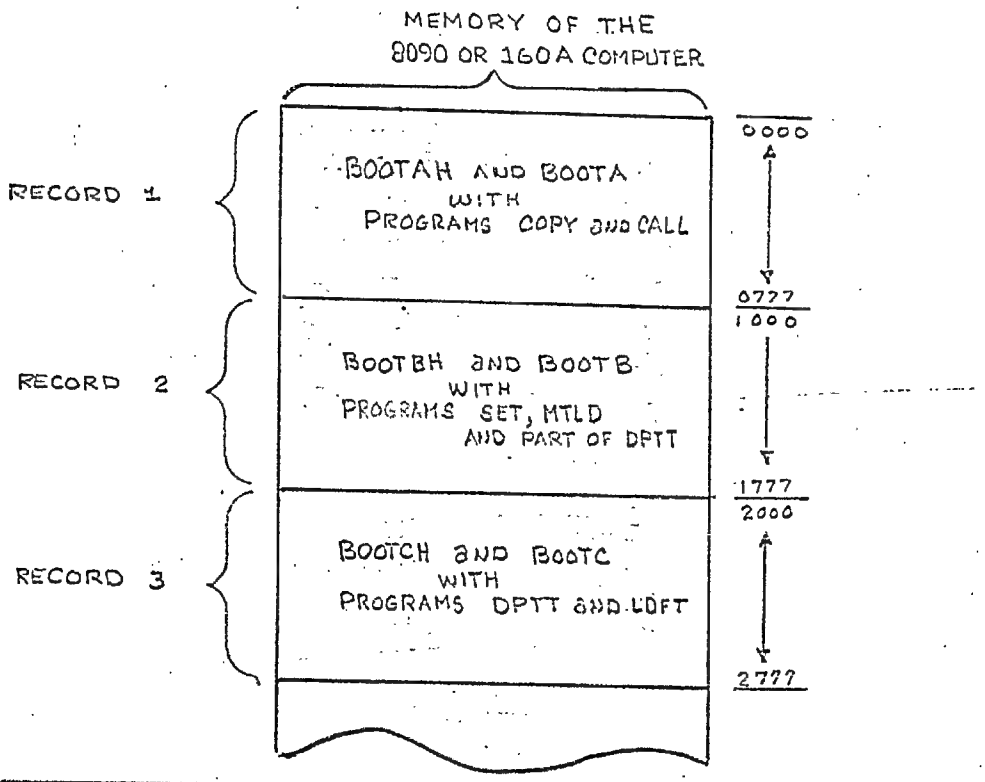
```
7043  7500   NEW2   EXC          1171   ** SELECT TAPE DRIVE TO ODD PARITY
7044  1171
7045  7500          EXC          1143
7046  1143
7047  7600          INA
7050  6010          ZJF   NEW3
7051  0242          LPN          42
7052  0740          SBN          40
7053  6013          ZJF   NEW4   4
7054  0402          LDN          2
7055  7700          HLT                 ** TAPE DRIVE 3 IS NOT READY
7056  6513          NZB   NEW2
7057  0000   NEWA                       ** LAST WORD ADDRESS FOR DUMP.
7060  7500   NEW3   EXC          1163   ** REWIND TO LOAD POINT
7061  1163
7062  7500   NEW4   EXC          1143   ** READ 1ST FRAME ON THE RECORD
7063  1143
7064  7600          INA
7065  6503          NZB   NEW4
7066  7500          EXC          1133
7067  1133
7070  7600          INA
7071  0777          SBN          77
7072  6016          ZJF   NEW6
7073  5611          AOF   NEWC
7074  0720          SBN          20
7075  6004          ZJF   NEW5
7076  7500          EXC          1133
7077  1133
7100  6516          NZB          NEW4
7101  0420   NEW5   LDN          20     ** SET A-REGISTER TO INDICATE
7102  7700          HLT                    (ALD) ALL READY = 17 FILES
7103  0000   NEWB                       ** CKSUM OF EACH WORD BEFORE DUMPED
7104  0000   NEWC                       ** PROGRAMS FILE NO. ON THE (ALD)
7105  0000   NEWD                       ** PROGRAMS WORDS FOR DUMPING
7106  0000   NEWG                       ** SWITCH FOR LAST RECORD TO DUMP
7107  7372   NEWH          NEWF  102    ** LAST WORD ADDRESS FOR THE RECORDS
7110  7500   NEW6   EXC          1123   ** BACK SPACE ONE RECORD BEFORE DUMP
7111  1123
7112  7600          INA
7113  2100   NEW7                2100   ** LOAD WORD FOR DUMPING
7114  0000                       0
7115  4310          STB   NEWD
7116  1200   NEW8   LPC          377    ** CKSUM THE LOWER 8-BITS.
7117  0377
7120  5315          RAB   NEWB
7121  1200   NEW9   LPC          400    ** ECHECK OVERFLOW OF THE 8-BITS
7122  0400
```

```
7123  6007          ZJF   NEWI0
7124  2321          LDB   NEWB
7125  1200          LPC         377
7126  0377
7127  4324          STB   NEWB
7130  5725          AOB   NEWB
7131  6510          NZB   NEW9
7132  2325  NEWI0   LDB   NEWD          ** LOAD WORD TO BE DIVIDE.
7133  1200          LPC         360
7134  0360
7135  0115          RS2
7136  0115          RS2
7137  0620          ADN         20
7140  4100  NEWII   STM   NEWF          ** STORE HIGH ORDER OF THE 8-BIT WOR
7141  7270
7142  5701          AOB   NEWII   1
7143  4204          STF   NEWI2
7144  2337          LDB   NEWD
7145  0217          LPN         17
7146  4100                4100
7147  0000  NEWI2                       ** ADDRESS TO STORE LOWER 4-BITS
7150  5707          AOB   NEWII   1
7151  4302          STB   NEWI2
7152  3600          SBC   NEWF    102
7153  7372
7154  6013          ZJF   NEWI3
7155  2347          LDB   NEWG
7156  6115          NZF   NEWI4
7157  5743          AOB   NEW7    1
7160  3500          SBM   NEWA
7161  7057
7162  6547          NZB   NEW7
7163  5755          AOB   NEWG
7164  2361          LDB   NEWB
7165  7101          JFI         1
7166  7115                NEW7    2
7167  2200  NEWI3   LDC   NEWF          ** RESET THE STORING ADDRESS TO A
7170  7270
7171  4330          STB   NEWII   1       BEGIANNING STATE
7172  6103          NZF   NEWI5
7173  2332  NEWI4   LDB   NEWII   1     ** STORE THE L.W.A. OF THE RECORD
7174  4365          STB   NEWH
7175  7500  NEWI5   EXC         1143    ** STATUS OF THE TAPE DRIVE 3
7176  1143
7177  7600          INA
7200  6005          ZJF   NEWI6
7201  0202          LPN         2
7202  6505          NZB   NEWI5
```

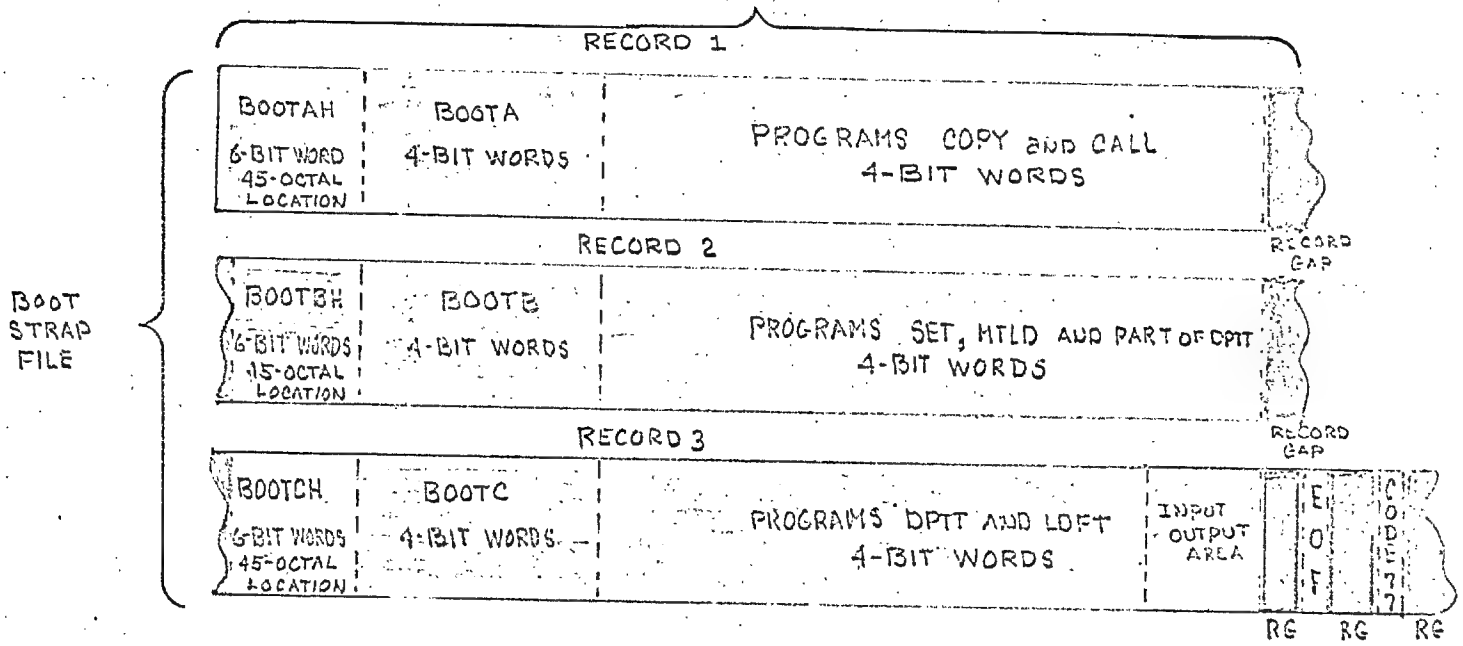
```
7203  7700          HLT                    ** TAPE DRIVE 3 IS NOT READY
7204  6507          NZB   NEW15
7205  2100  NEW16   LDM   NEWH             ** STORE THE L.W.A. OF RECORD
7206  7107
7207  4204          STF   NEW17               FOR THE OUTPUT.
7210  7500          EXC         1113
7211  1113
7212  7304          OUT   NEW18
7213  0000  NEW17                          ** PRESTORED L.W.A.
7214  7101          JFI         1
7215  7217                NEW19
7216  7270  NEW18         NEWF             ** FIRST WORD ADDRESS FOR OUTPUT.
7217  7500  NEW19   EXC         1143       ** STATUS OF THE LAST RECORD
7220  1143
7221  7600          INA                       THAT HAS BEEN OUTPUTTED.
7222  6020          ZJF   NEW21
7223  0206          LPN         6
7224  0704          SBN         4
7225  6003          ZJF   NEW20
7226  7700          HLT                    ** TAPE DRIVE 3 IS NOT READY
7227  6510          NZB   NEW19
7230  7500  NEW20   EXC         1123       ** PARITY ERROR, BACKSPACE
7231  1123
7232  7600          INA                       ONE RECORD TO TRY AGAIN
7233  5606          AOF   NEWE
7234  0705          SBN         5
7235  6530          NZB   NEW16
7236  4203          STF   NEWE
7237  7700          HLT
7240  6433          ZJB   NEW16
7241  0000  NEWE                          ** PARITY ERROR COUNTER.
7242  4301  NEW21   STB   NEWE             ** TEST POINT FOR LAST RECORD
7243  2100          LDM   NEWG
7244  7106
7245  6103          NZF   NEW22.              TO BE OUTPUTTED.
7246  7101          JFI         1
7247  7155                NEW12   6
7250  7500  NEW22.  EXC         1113       ** OUTPUT IDENTIFICATION MARKS
7251  1113
7252  7500          EXC         1123          ON THE (ALD) TAPE.
7253  1123
7254  7600          INA
7255  7500          EXC         1113
7256  1113
7257  7500          EXC         1113
7260  1113
7261  7477          OTN         77
7262  7500          EXC   1163
```

```
7263  1163
7264  2100          LDM   NEWC
7265  7104
7266  7700          HLT                    ** FILE NO. INDICATED IN A-REGISTER
      7270          PRG          7270
7270  0000  NEWF
      0000          END
```

PROGRAM PACK FORMAT



RECORDS OF THE OUTPUT STORED ON MAGNETIC TAPE.



IT TAKES THE MEMORY LOCATIONS FROM 0000 TO 2777 OF THE 8090 OR 160A COMPUTER and OUTPUTS THEM TO THE MAGNETIC TAPE. STARTS WITH RECORD 1, THEN RECORD 2 AND 3 FOLLOWS.

N Nicholas

PACK

I. Function

A. General

This program is for the 8090 or 160A Computer and will generate the BOOT STRAP on the Automatic Load and Dump Tape which can be used by the 8092B Computer.

B. Detail

The binary output paper tape from the OSAS-A assembly for the BOOT STRAP is loaded with a binary loader into the 8090 or 160A core starting at word zero.

Records of the BOOT STRAP take the following Core locations. Record one, is in 0000 to 0777, record two is in 1000 to 1777 and record three is in 2000 to 2777. The first 45 octal locations of the records use only the low 6-bits of the 12-bit word, and are stored into an output area. The remaining locations use the lower 8-bits of the 12-bit word, and are divided into two 4-bit words with the high order of the 8-bit word being identified, then are stored into an output area.

Record one is processed in this manner first, then is outputted to the magnetic tape in the binary and low density mode, record two and three follow. The end of file mark is then outputted and followed with a code mark. (Octal 77). The magnetic tape is now an Automatic Load and Dump Tape for the 8092B Computer.

II. Control Words

PACKA	Starting address of the record being dumped.
PACKB	Last word address, for the 6-bit words first, then the 4-bit words.
PACKC	Starting address of the output area.
PACKD	Temporary storage for the 12-bit words.
PACKE	Counter for the output of the three records.

III. Entry Points

None

IV. Exits

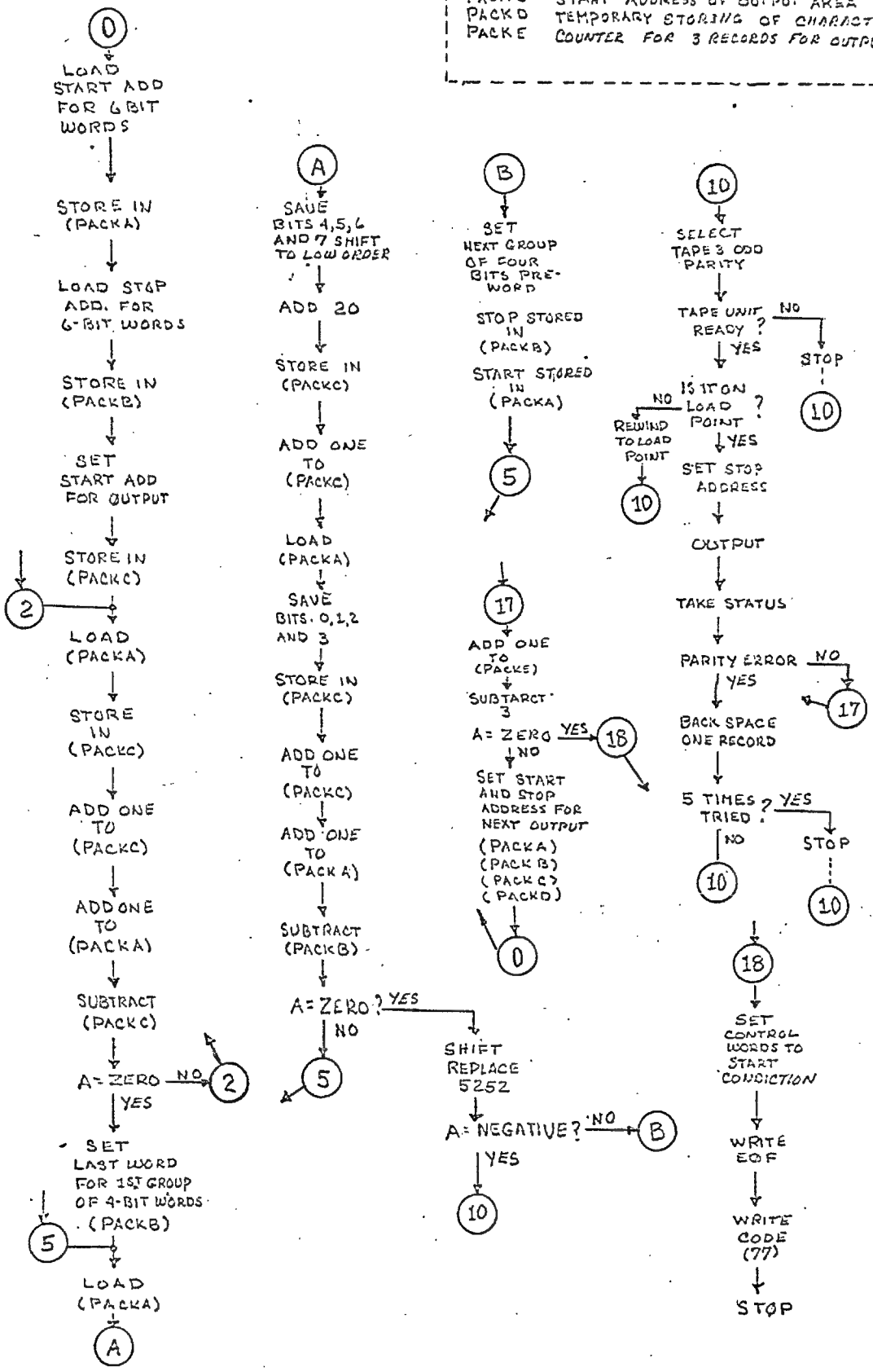
None

PROGRAM NAME
PACK

OUTPUTS BOOT, TO MAGNETIC TAPE
FROM 8090 TO A 603

PROGRAM CONTROL WORDS

PACK A	START ADDRESS OF PROGRAM BEING DUMPED
PACK B	STOP ADDRESS 1ST 6 BITS THE 4 BIT PREWORD
PACK C	START ADDRESS OF OUTPUT AREA
PACK D	TEMPORARY STORING OF CHARACTER
PACK E	COUNTER FOR 3 RECORDS FOR OUTPUT.



R. Nicholas

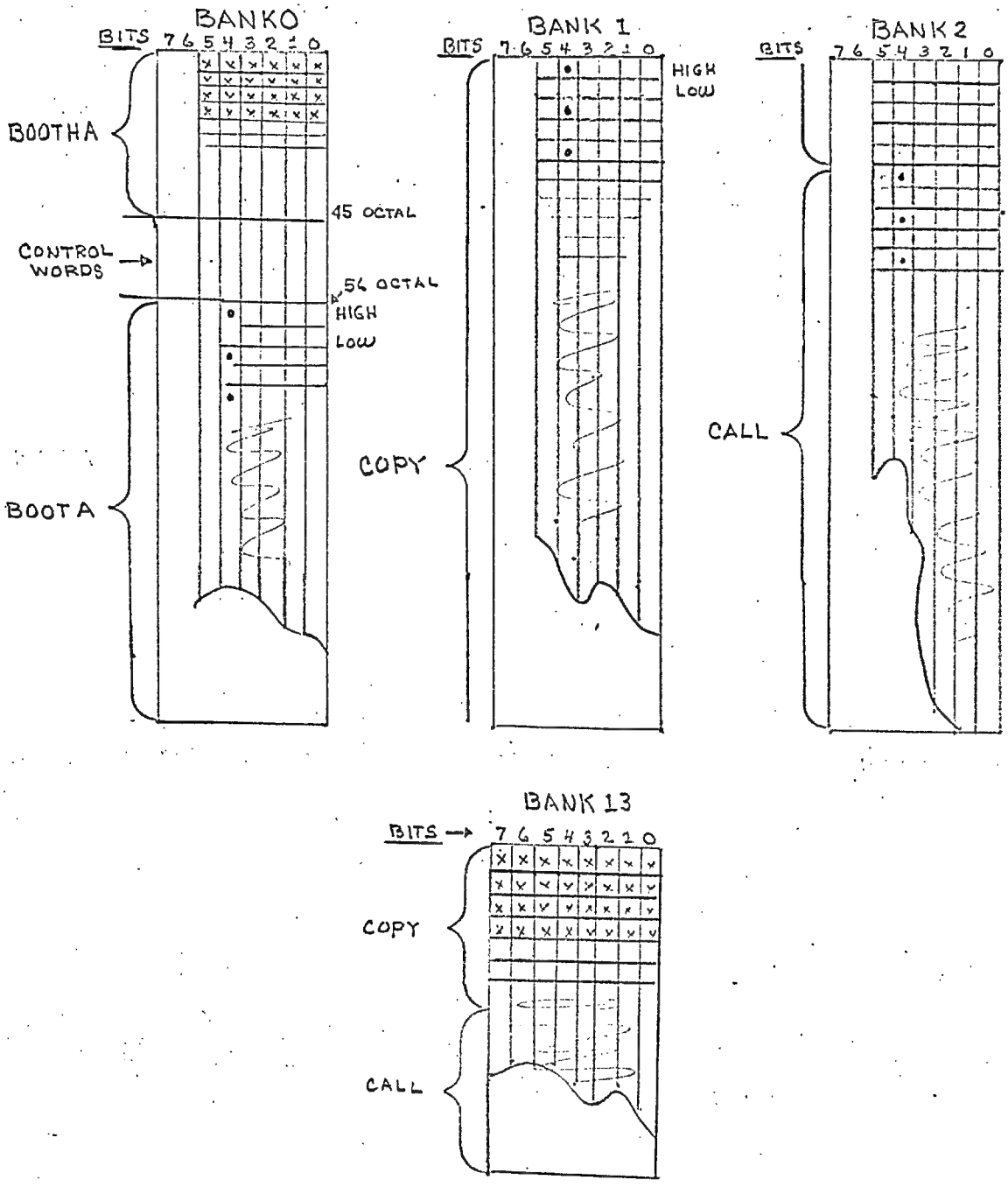
```
      7000          ORG          7000
                                                  ******************************
                                                  * 8090 PROGRAM TO CREATE BOOT
                                                  *   STRAP ON TAPE FOR 8092
                                                  *      TELEPROGRMMER
                                                  ******************************
      0000          BNKO
7000  2200   PACK   LDC          0
7001  0000
7002  4273          STF   PACKA
7003  2200   PACK1  LDC          56
7004  0056
7005  4271          STF   PACKB
7006  2200          LDC          3000
7007  3000
7010  4267          STF   PACKC
7011  4100          STM   PACK14
7012  7141
7013  2262   PACK2  LDF   PACKA          ** START ADDRESS OF DATA
7014  4204          STF   PACK3
7015  2262          LDF   PACKC
7016  4204          STF   PACK4
7017  2100                       2100
7020  0000   PACK3                       ** PRESTORED ADDRESS FOR LOADING
7021  4100                       4100
7022  0000   PACK4                       ** PRESTORED ADDRESS FOR STORING
7023  5654          AOF   PACKC
7024  5651          AOF   PACKA
7025  3651          SBF   PACKB
7026  6513          NZB   PACK2
7027  2200          LDC          227
7030  0227
7031  4245          STF   PACKB
7032  2243   PACK5  LDF   PACKA          ** GET NEXT ADDRESS FOR NEXT WORD
7033  4204          STF   PACK6
7034  2243          LDF   PACKC
7035  4212          STF   PACK7
7036  2100                       2100
7037  0000   PACK6                       ** PRESTORED ADDRESS FOR LOADING
7040  4240          STF   PACKD
7041  1200          LPC          360
7042  0360
7043  0115          RS2
7044  0115          RS2
7045  0620          ADN          20
7046  4100                       4100
7047  0000   PACK7                       ** PRESTORED ADDRESS FOR STORING
7050  5627          AOF   PACKC
```

```
7051  4204          STF   PACK8
7052  2226          LDF   PACKD
7053  0217          LPN         17
7054  4100                      4100
7055  0000  PACK8                      ** PRESTORED ADDRESS FOR STORING
7056  5621          AOF   PACKC
7057  5616          AOF   PACKA
7060  3616          SBF   PACKB
7061  6527          NZB   PACK5
7062  4600          SRC         5252
7063  5252
7064  6316          NJF   PACK10
7065  2200          LDC         400
7066  0400
7067  4206          STF   PACKA
7070  2200  PACK9   LDC         1001    ** SET NEW ADDRESS FOR STOP.
7071  1001
7072  4204          STF   PACKB
7073  7101          JFI         1
7074  7032                PACK5
7075  0000  PACKA                       ** START ADDRESS FOR LOADING CHAR.
7076  0000  PACKB                       ** STOP ADDRESS FOR 6 BITS, THEN 4 B
7077  0000  PACKC                       ** START OF OUTPUT AREA
7100  0000  PACKD                       ** TEMPORARY STOREAGE OF CHARACTER
7101  0000  PACKE                       ** TIMES COUNTER FOR 3 OUTPUTS
7102  4600  PACK10  SRC         2222     ** CHECK IF FIRST TIME THROUGH
7103  2222
7104  6224          PJF   PACK12
7105  7500          EXC         1171
7106  1171
7107  7500          EXC         1143
7110  1143
7111  7600          INA
7112  0242          LPN         42
7113  4206          STF   PACK11
7114  0202          LPN         2
7115  6003          ZJF   PACK11 -1
7116  7700          HLT
7117  6510          NZB   PACK10 5
7120  2200                      2200
7121  0000  PACK11                      ** PRESTORED STATUS
7122  0240          LPN         40
7123  6105          NZF   PACK12
7124  7500          EXC         1163
7125  1163
7126  7101          JFI         1
7127  7107                PACK10 5
7130  2331  PACK12  LDB   PACKC        ** LAST WORD ADDRESS FOR OUTPUT
```

```
7131  0601          ADN     1
7132  4204          STF     PACK13
7133  7500          EXC     1113
7134  1113
7135  7304          OUT     PACK14
7136  0000  PACK13                  ** PRESTORED L. W. A. FOR OUTPUT.
7137  7101          JFI     1
7140  7142          PACK15
7141  0000  PACK14                  ** PRESTORED F. W. A. FOR OUTPUT
7142  7500  PACK15  EXC     1143    ** STATUS OF LAST OUTPUT
7143  1143
7144  7600          INA
7145  0204          LPN     4
7146  6015          ZJF     PACK17
7147  7500          EXC     1123
7150  1123
7151  7600          INA
7152  5610          AOF     PACK16
7153  0705          SBN     5
7154  6552          NZB     PACK10
7155  4205          STF     PACK16
7156  2200          LDC     7777
7157  7777
7160  7700          HLT
7161  6557          NZB     PACK10
7162  0000  PACK16                  ** PARITY ERROR COUNTER.
7163  5762  PACK17  AOB     PACKE   ** TIMES COUNTER FOR OUTPUT
7164  0703          SBN     3
7165  6027          ZJF     PACK18
7166  2200          LDC     1000
7167  1000
7170  5100          RAM     PACK    1
7171  7001
7172  2200          LDC     1000
7173  1000
7174  5100          RAM     PACK1   1
7175  7004
7176  2200          LDC     1000
7177  1000
7200  5100          RAM     PACK4   6
7201  7030
7202  2200          LDC     1000
7203  1000
7204  5100          RAM     PACK9   -2
7205  7066
7206  2200          LDC     1000
7207  1000
7210  5100          RAM     PACK9   1
```

```
7211  7071
7212  7101          JFI          1
7213  7000                PACK
7214  4100   PACK18 STM   PACKE          ** CLEAR TIMES COUNTER AND
7215  7101
7216  4100          STM   PACK   1          RESET TO START CONDICTION
7217  7001
7220  0456          LDN          56
7221  4100          STM   PACK1  1
7222  7004
7223  2200          LDC          227
7224  0227
7225  4100          STM   PACK4  6
7226  7030
7227  2200          LDC          400
7230  0400
7231  4100          STM   PACK9  -2
7232  7066
7233  2200          LDC          1001
7234  1001
7235  4100          STM   PACK9  1
7236  7071
7237  7500          EXC          1113
7240  1113
7241  7500          EXC          1113
7242  1113
7243  7477          OTN          77
7244  7700          HLT
7245  7101          JFI          1
7246  7000                PACK
      0000          END
```

BOOTHA and BOOTA FORMAT



BOOTHA : BANK-0, THE FIRST 45 OCTAL LOCATION ARE 6-BIT WORDS. BANK-0 FROM 56 (OCTAL) TO 376 (OCTAL) OF BANK 2, THEY ARE 4-BIT WORDS WITH THE HIGH ORDER FOR AN 8-BIT WORD BEING IDENTIFIED BY BIT POSITION 4.

BANK 13 COPY AND CALL

AFTER, THE 4-BIT WORDS ARE ASSEMBLED INTO 8-BIT WORDS.

N Nicholas

BOOTAH AND BOOTA

I. Function

A. General

To store two programs COPY and CALL into Bank 13 and then exit to Program Call for the next record of the BOOT STRAP file.

B. Detail

The BOOT STRAP has three records in its file. Programs BOOTAH and BOOTA, is the first record and are loaded into the 8092B core with the Load and Run switches of the Teleprogrammer starting with word 0, Bank 0. BOOTAH is a set of six bit per word instructions, when executed it builds a set of eight bit per word instructions, from two four bit words. This becomes program BOOTA. BOOTA will take the remaining four bit words, combine the high and the low orders, to build an eight bit word and stores them into bank 13. These eight bit words are program instructions belonging to COPY and CALL.

Then will exit to Program CALL for the next record of the BOOT STRAP.

II. Control Tags

TAG 1. Used while combining the high and the low order of each word before storing.

TAG 2. First set to Bank 13 to be used while storing programs COPY and CALL, then is set for the exit to program CALL.

III. Control Words

BOOTAO	Temporary storage for the building of the eight bit word.
BOOTAA	Lower order of the eight bit word.
BOOTAB	High order of the eight bit word.
BOOTAC	Temporary storage for the building of the eight bit word.
BOOTAD	Address for storing COPY and CALL.
BOOTAE	Crossing of the banks.
BOOTAF	Starting address of the four bit words.
BOOTAG	Flag test for the completion of storing COPY and CALL to their proper bank.

IV Entry Point

BOOTAH

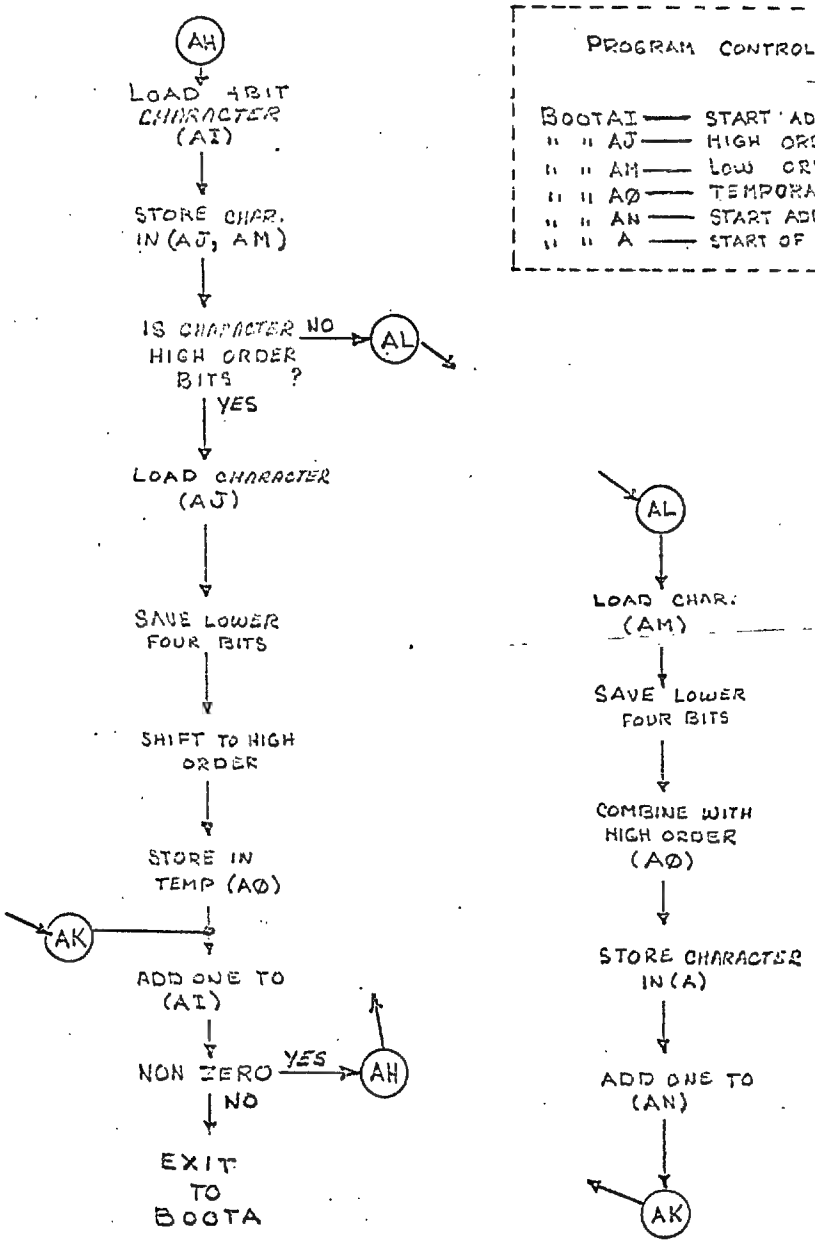
V. Exits

To Program CALL

PROGRAM NAME

BOOTAH

IT ASSEMBLES A PROGRAM TO WORK WITH TAGS



PROGRAM CONTROL WORDS

BOOTAI — START ADDRESS OF FOUR BITS PER WORD
" " AJ — HIGH ORDER OF WORD
" " AM — LOW ORDER OF WORD
" " AØ — TEMPORARY STORAGE
" " AN — START ADDRESS OF 8 BITS PER WORD
" " A — START OF PROGRAM

N Nichols

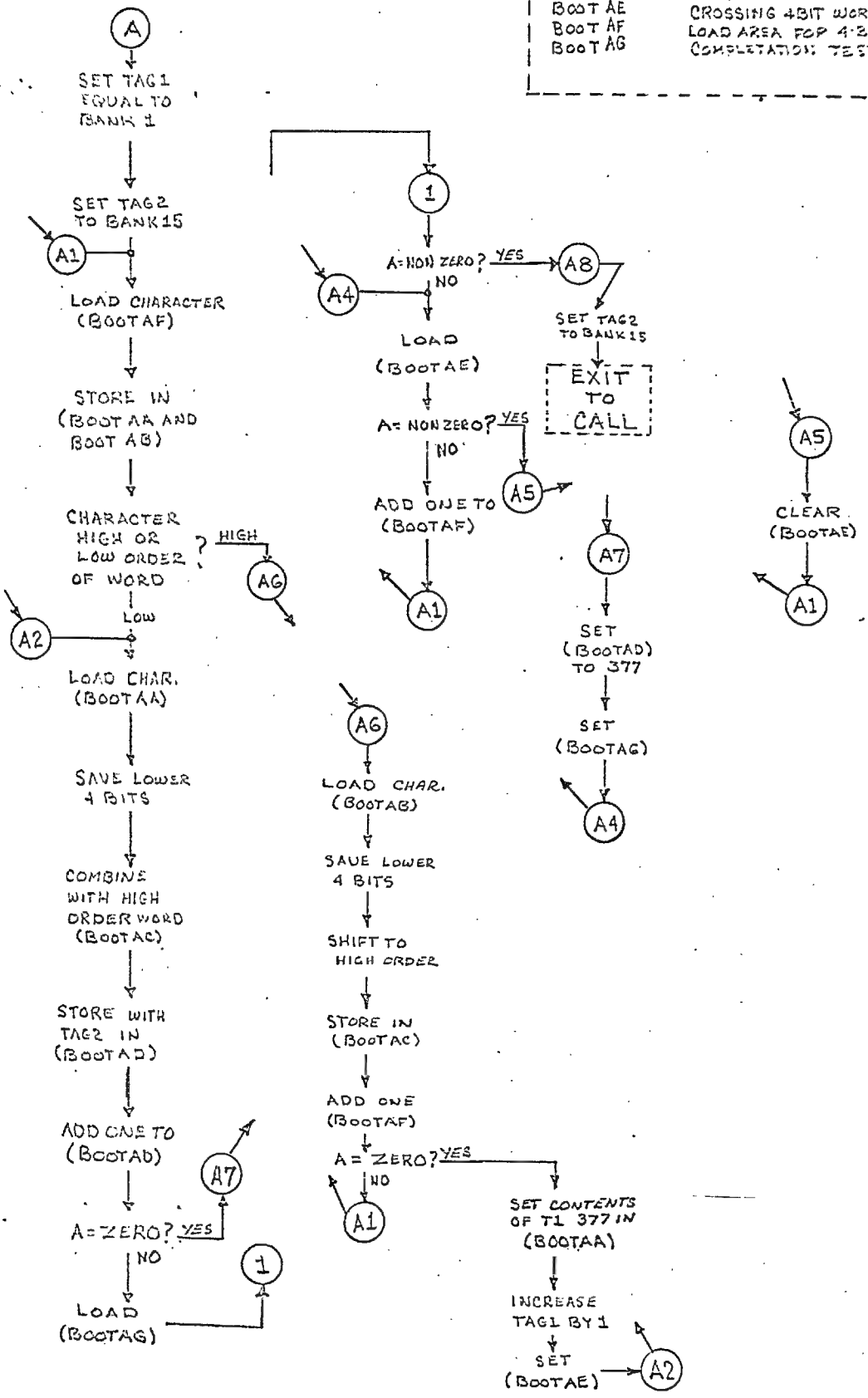
PROGRAM NAME

BOOTA

ASSEMBLES PROGRAMS COPY AND CALL
STORES THEM IN BANK 15

PROGRAM CONTROL WORDS

BOOTAA	LOW ORDER OF 4 BIT WORD
BOOTAB	HIGH ORDER OF 4 BIT WORD
BOOTAC	TEMPORARY STORAGE BUILDING WORD
BOOTAD	AREA FOR STORING 8 BIT WORD
BOOTAE	CROSSING 4BIT WORD BANKS
BOOTAF	LOAD AREA FOR 4 BIT WORDS
BOOTAG	COMPLETATION TEST



W Nicholas

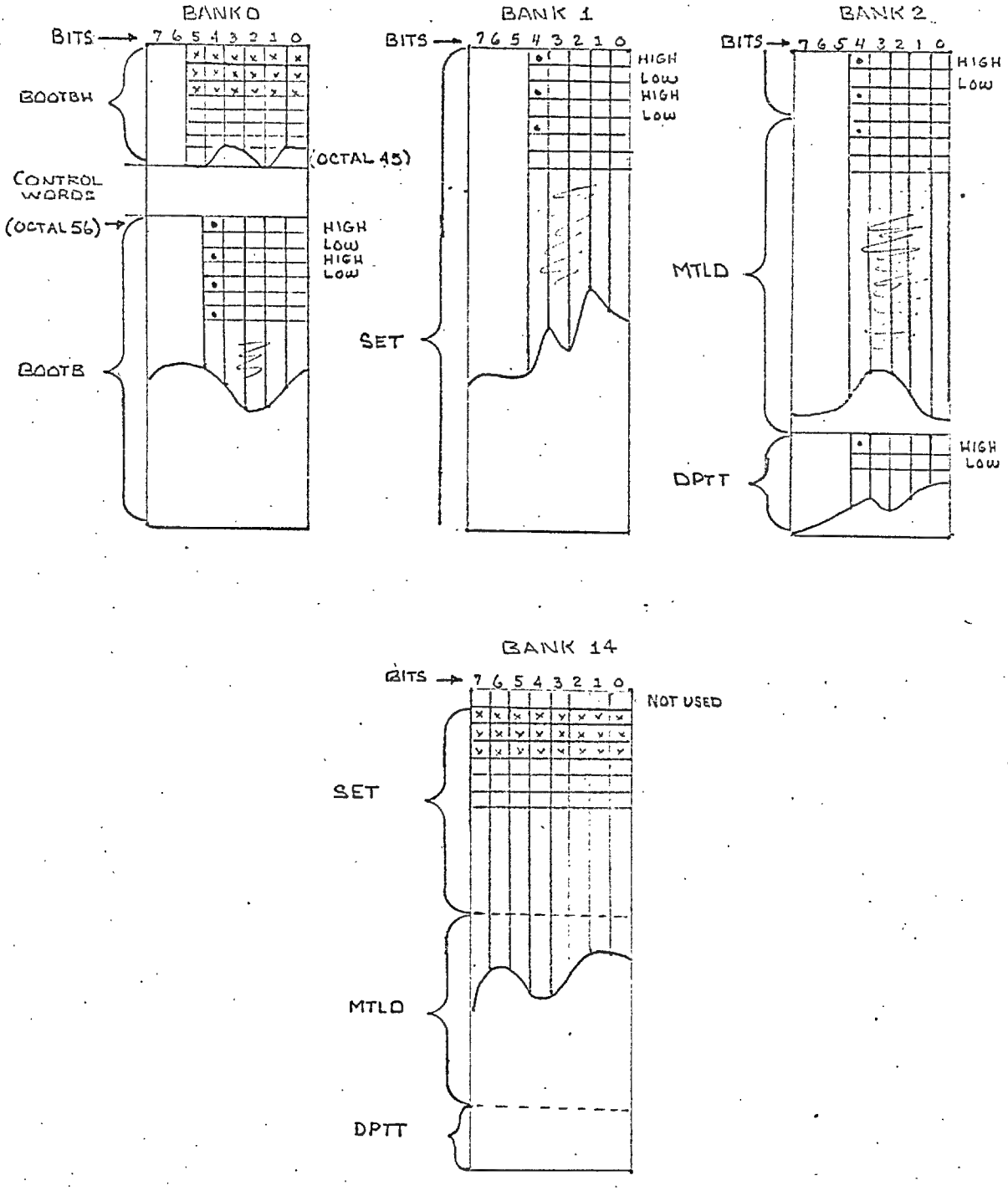
```
0000          PRG          0
                                                  ***************
                                              ******* PROGRAM NAMES ******
                                              *                           *
                                              *        BOOTAH             *
                                              *                           *
                                              * 6BIT INSTRUCTION PROGRAM *
                                              *    ASSEMBLES AND  8BIT   *
                                              *    INSTRUCTION PROGRAM   *
                                              *      CALLED BOOTA        *
                                              *                           *
                                              *        BOOTA              *
                                              *                           *
                                              * 8BIT INSTRUCTION PROGRAM *
                                              *    ASSEMBLES AND  8BIT   *
                                              *    INSTRUCTION  WORD     *
                                              *    STORES THEM IN HIGH   *
                                              ******     CORE        ******
                                                  ***************
0000  0021  BOOTAH      LDM
0001  0056  BOOTAI              BOOTA
0002  0041              STM
0003  0013                      BOOTAJ
0004  0041              STM
0005  0033                      BOOTAM
0006  0010              LPN
0007  0020                      20
0010  0060              ZJP
0011  0032                      BOOTAL
0012  0020              LDN
0013  0000  BOOTAJ                      ** LOAD HIGH ORDER OF WORD
0014  0010              LPN
0015  0017                      17
0016  0001              SHA
0017  0001              SHA
0020  0001              SHA
0021  0001              SHA
0022  0041              STM
0023  0046                      BOOTAO
0024  0055  BOOTAK      RAO             ** INCREASE START ADDRESS BY ONE
0025  0001                      BOOTAI
0026  0061              NZP
0027  0000                      BOOTAH
0030  0064              UJP
0031  0056                      BOOTA
0032  0020  BOOTAL      LDN             ** LOAD LOW ORDER OF WORD
0033  0000  BOOTAM                      ** PRESTORED WORD
0034  0010              LPN
```

```
0035  0017                        17
0036  0015              LSM
0037  0046                        BOOTAO
0040  0041              STM
0041  0056  BOOTAN                BOOTA.  ** STORE WORD INCREASE
0042  0055              RAO                   STORE AREA BY ONE
0043  0041                        BOOTAN
0044  0064              UJP
0045  0024                        BOOTAK.
0046  0000  BOOTAO                       ** STORE AREA, BUILDING WORD
0047  0000  BOOTAA                       ** LOWER ORDER OF WORD
0050  0000  BOOTAB                       ** HIGH ORDER OF WORD
0051  0000  BOOTAC                       ** STORE AREA, FOR BUILDING WORD
0052  0000  BOOTAD                       ** AREA FOR STORING WORD
0053  0000  BOOTAE                       ** CROSSING OF BANK
0054  0000  BOOTAF                       ** START ADDRESS OF INPUT
0055  0000  BOOTAG                       ** TEST, FOR COMPLETATION
0056  0020  BOOTA       LDN
0057  0001                        1
0060  0102              ATT       T1
0061  0020              LDN
0062  0015                        15
0063  0202              ATT       T2
0064  0122  BOOTA1      LDI       T1      ** ADDRESS OF NEXT CHARACTER
0065  0054                        BOOTAF
0066  0041              STM
0067  0047                        BOOTAA
0070  0041              STM
0071  0050                        BOOTAB
0072  0010              LPN
0073  0020                        20
0074  0061              NZP
0075  0133                        BOOTA6
0076  0021  BOOTA2      LDM               ** LOWER ORDER OF WORD
0077  0047                        BOOTAA
0100  0010              LPN
0101  0017                        17
0102  0015              LSM
0103  0051                        BOOTAC
0104  0242  BOOTA3      STI       T2      ** STORE BUILT CHARACTER
0105  0052                        BOOTAD
0106  0055              RAO
0107  0052                        BOOTAD
0110  0060              ZJP
0111  0165                        BOOTA7
0112  0021              LDM
0113  0055                        BOOTAG
0114  0061              NZP
```

```
0115  0175                          BOOTA8
0116  0021   BOOTA4        LDM              ** TEST IF CROSSING BANKS
0117  0053                          BOOTAE
0120  0061                  NZP
0121  0126                          BOOTA5
0122  0055                  RAO
0123  0054                          BOOTAF
0124  0064                  UJP
0125  0064                          BOOTA1
0126  0003   BOOTA5        TTA              ** CROSSING OF A BANK
0127  0041                  STM
0130  0053                          BOOTAE
0131  0064                  UJP
0132  0064                          BOOTA1
0133  0021   BOOTA6        LDM              ** HIGH ORDER OF CHARACTER
0134  0050                          BOOTAB
0135  0010                  LPN
0136  0017                          17
0137  0001                  SHA
0140  0001                  SHA
0141  0001                  SHA
0142  0001                  SHA
0143  0041                  STM
0144  0051                          BOOTAC
0145  0055                  RAO
0146  0054                          BOOTAF
0147  0061                  NZP
0150  0064                          BOOTA1
0151  0121                  LDM     T1
0152  0377                          377
0153  0041                  STM
0154  0047                          BOOTAA
0155  0103                  TTA     T1
0156  0030                  ADN
0157  0001                          1
0160  0102                  ATT     T1
0161  0055                  RAO
0162  0053                          BOOTAE
0163  0064                  UJP
0164  0076                          BOOTA2
0165  0020   BOOTA7        LDN              ** SET STORE AREA TO 377
0166  0377                          377         FOR NEXT CHARACTER
0167  0041                  STM
0170  0052                          BOOTAD
0171  0055                  RAO
0172  0055                          BOOTAG
0173  0064                  UJP
0174  0116                          BOOTA4
```

```
0175  0020   BOOTA8      LDN              ** SET TAG2 FOR JUMP
0176  0015                      15          EXIT TO PROGRAM CALL
0177  0202               ATT    T2
0200  0264               UJP    T2
0201  7777                      CALL
```

BOOTBH and BOOTB
FORMAT



BOOTBH BANK-0, THE FIRST 45 (OCTAL) LOCATION ARE 6-BIT WORDS.
BANK 0 FROM 56 (OCTAL) TO 376 OF BANK 2, THEY ARE
4-BIT WORDS WITH THE HIGH ORDER FOR AN 8-BIT WORD
BEING IDENTIFIED BY BIT POSITION 4.

BANK 14 SET MTLD AND DPTT.
AFTER, THE 4-BIT WORDS ARE ASSEMBLED INTO 8-BIT WORDS.
NOTE: WORD 600 NOT USED.

R Nicholas

BOOTBH AND BOOTB

I. Function

A. General

To store the programs, SET, MTLD and part of the DPTT, into bank 14 and then exit to program CALL for the third record of the boot strap.

B. Detail

The BOOT STRAP has three records in its file. Programs BOOTBH and BOOTB, is the second record and becomes loaded into the 8092B core by program CALL, starting with address zero of bank zero. BOOTBH is a set of six bit per word instructions, when executed, it builds a set of eight bit per word instructions from two four bit words. This becomes program BOOTB. BOOTB will take remaining four bit words, combine the high and the low orders, to build an eight bit word and stores them into bank 14. These eight bit words are program instructions belonging to SET, MTLD and DPTT.

Then will exit to program CALL for record three of the BOOT STRAP.

II. Control Tags

TAG 1. Used while combining the high and the low order of each word before storing.

TAG 2. First set to bank 14 to be used while storing programs SET, MTLD and DPTT, then is set for the exit to program CALL.

III. Control Words

BOOTBO Temporary storage for the building of the eight bit word.

BOOTBA Lower order of the eight bit word.

BOOTBB High order of the eight bit word.

BOOTBC Temporary storage for the building of the eight bit word.

BOOTBD Address for storing SET, MTLD and DPTT.

BOOTBE Crossings of a bank.

BOOTBF Starting address of the four bit words.

BOOTBG Flag Test for completion of storing SET, MTLD and DPTT to their proper bank.

IV. Entry Point

BOOTHB

V. Exits

To program CALL

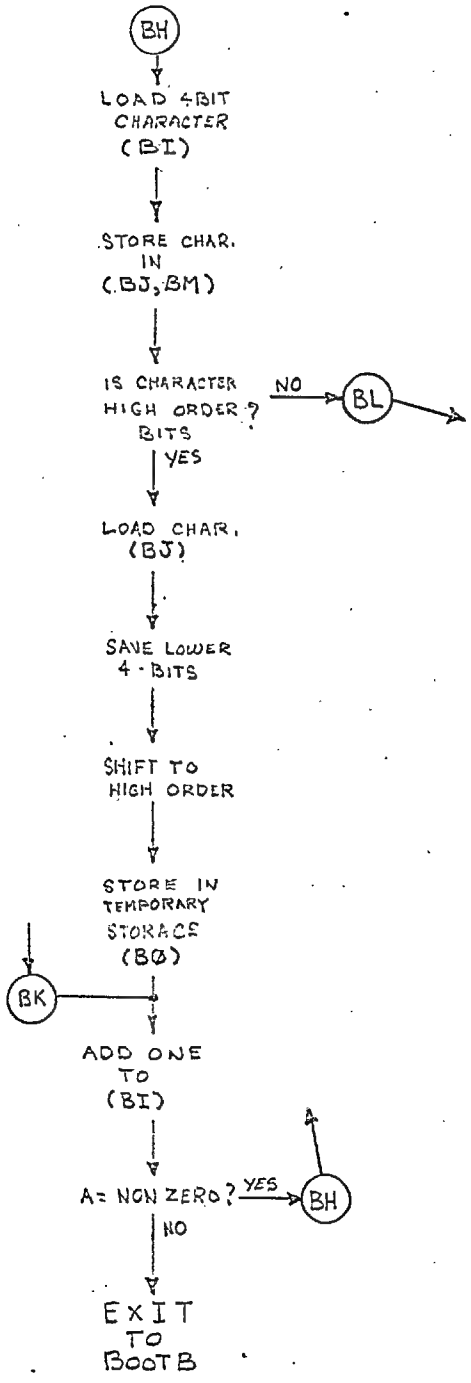
Program Name

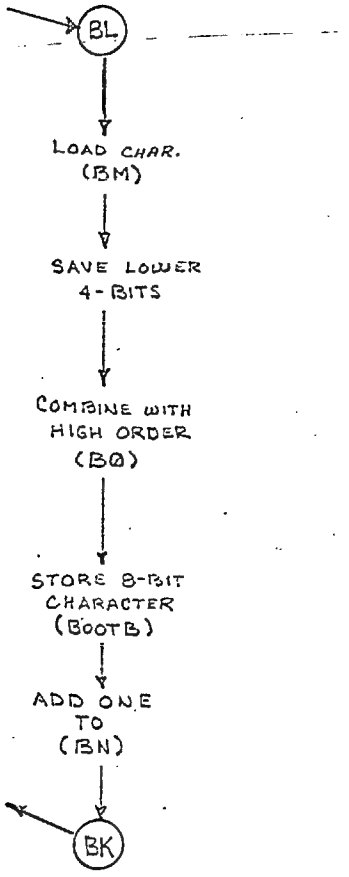
BootBH

IT ASSEMBLES A PROGRAM TO WORK WITH TAGS

Program Control Words

BootBI	START ADDRESS OF 4-BIT WORDS
BJ	HIGH ORDER OF WORD
BM	LOW ORDER OF WORD
BØ	TEMPORARY STORAGE
BN	START ADDRESS OF 8-BIT WORDS
Boot B	STARTING ADDRESS OF PROGRAM BootB





N. Nicholas

PROGRAM NAME

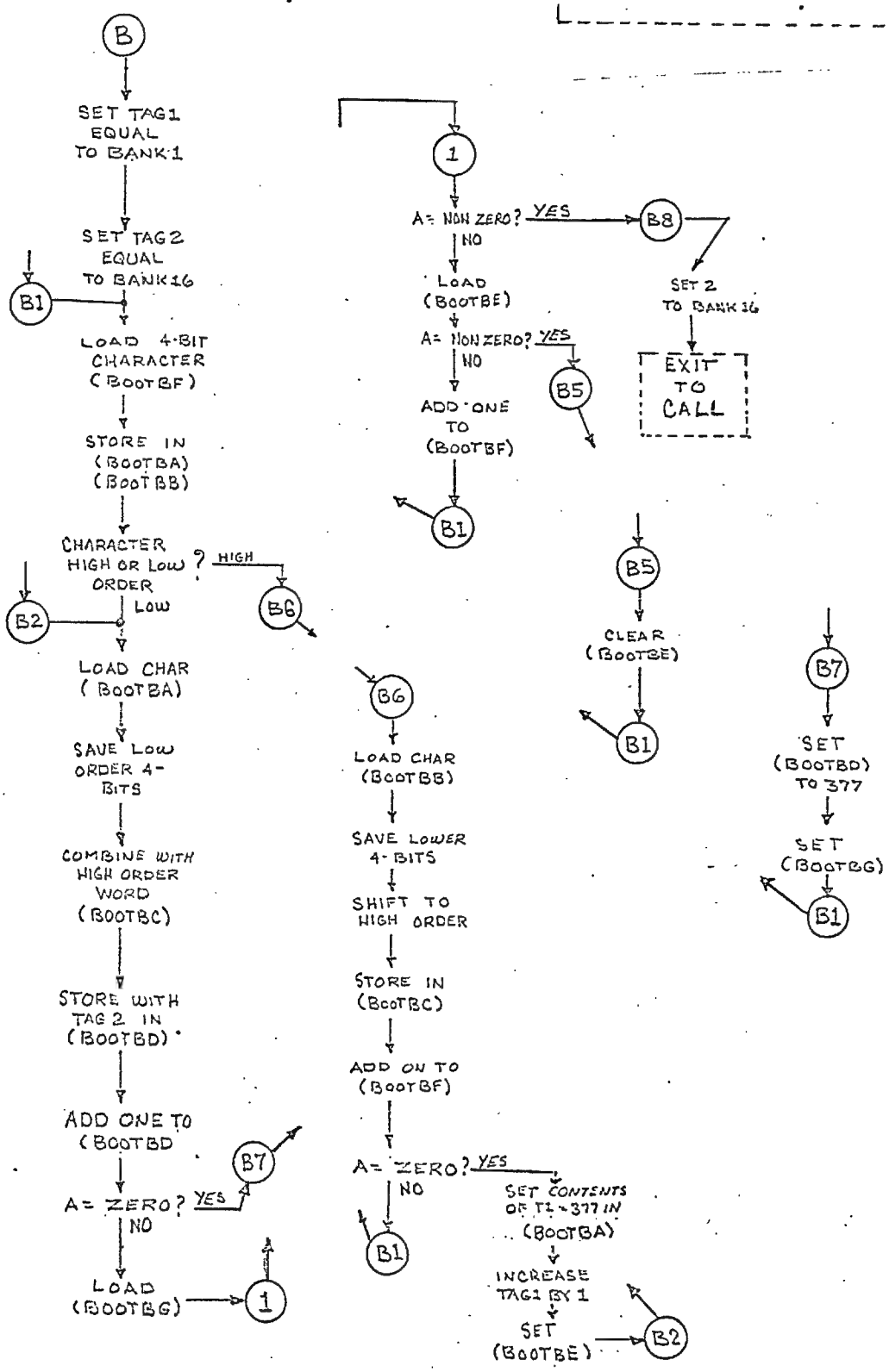
BOOTB

ASSEMBLES PROGRAMS SET AND MTLD.

STORES THEM IN BANK 16

PROGRAM CONTROL WORDS

BOOTBA	LOW ORDER OF 4 BIT WORD
BOOTBB	HIGH ORDER OF 4 BIT WORD
BOOTBC	TEMPORARY STORING BUILDING WORD
BOOTBD	AREA FOR STORING 8 BIT WORD
BOOTBE	CROSSING A 4-BIT WORD BANK
BOOTBF	LOAD AREA FOR 4-BIT WORDS
BOOTBG	COMPLETATION TEST



M. Nicholas

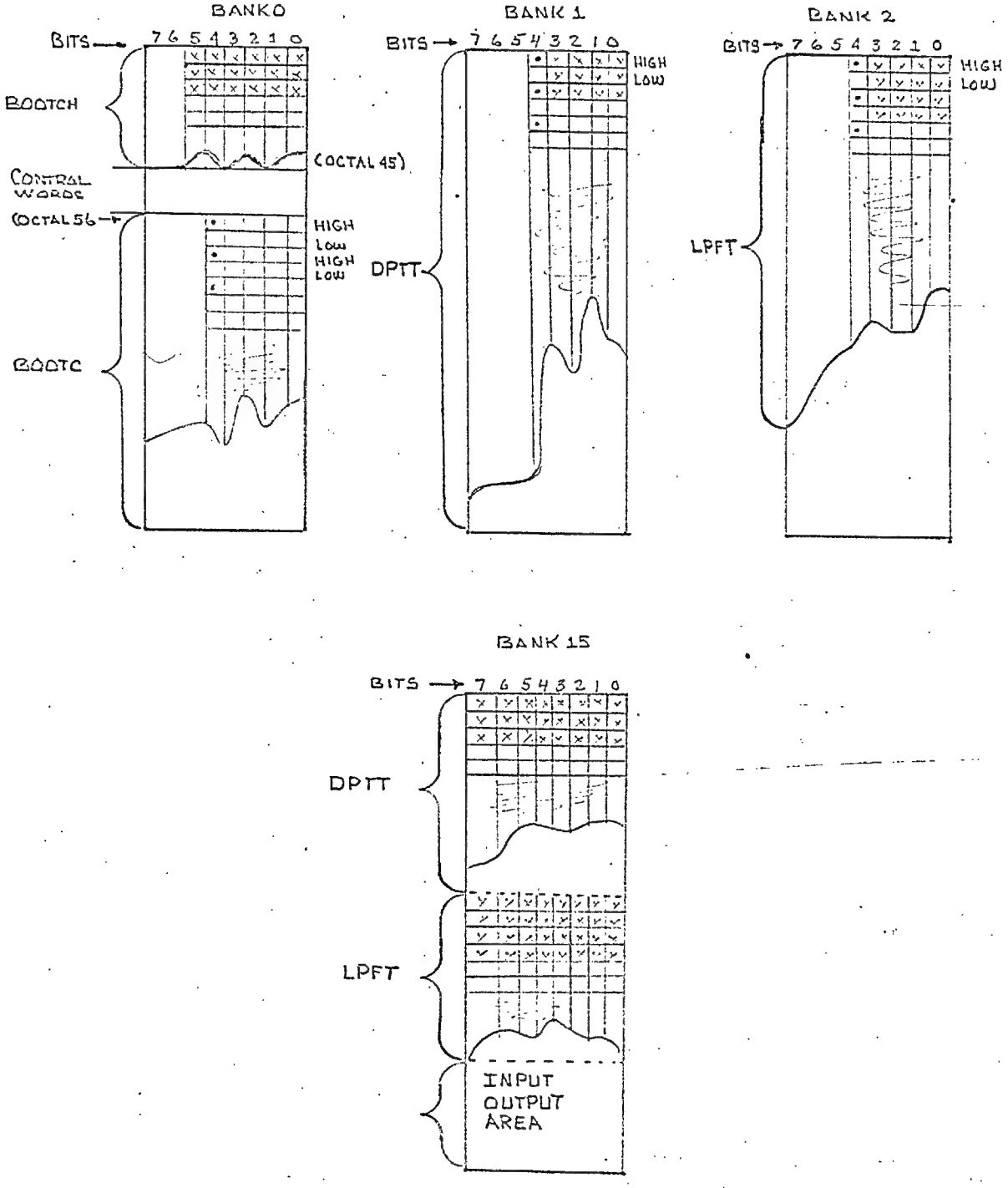
```
0000          PRG          0
                                                  ***************
                                              ******* PROGRAM NAMES ******
                                              *                           *
                                              *        BOOTBH             *
                                              *                           *
                                              * 6BIT INSTRUCTION PROGRAM *
                                              *    ASSEMBLES AND  8BIT   *
                                              *    INSTRUCTION PROGRAM   *
                                              *      CALLED BOOTB        *
                                              *                           *
                                              *        BOOTB              *
                                              *                           *
                                              * 8BIT INSTRUCTION PROGRAM *
                                              *    ASSEMBLES AND  8BIT   *
                                              *    INSTRUCTION  WORD     *
                                              *    STORES THEM IN HIGH   *
                                              ******     CORE       ******
                                                  ***************
0000  0021  BOOTBH      LDM
0001  0056  BOOTBI              BOOTB
0002  0041              STM
0003  0013                      BOOTBJ
0004  0041              STM
0005  0033                      BOOTBM
0006  0010              LPN
0007  0020                      20
0010  0060              ZJP
0011  0032                      BOOTBL
0012  0020              LDN
0013  0000  BOOTBJ                      ** LOAD HIGH ORDER OF WORD
0014  0010              LPN
0015  0017                      17
0016  0001              SHA
0017  0001              SHA
0020  0001              SHA
0021  0001              SHA
0022  0041              STM
0023  0046                      BOOTBO
0024  0055  BOOTBK      RAO             ** INCREASE START ADDRESS BY ONE
0025  0001                      BOOTBI
0026  0061              NZP
0027  0000                      BOOTBH
0030  0064              UJP
0031  0056                      BOOTB
0032  0020  BOOTBL      LDN             ** LOAD LOW ORDER OF WORD
0033  0000  BOOTBM                      ** PRESTORED WORD
0034  0010              LPN
```

```
0035  0017                        17
0036  0015              LSM
0037  0046                        BOOTBO
0040  0041              STM
0041  0056  BOOTBN                BOOTB   ** STORE WORD, INCREASE
0042  0055              RAO                  STORE AREA BY ONE
0043  0041                        BOOTBN
0044  0064              UJP
0045  0024                        BOOTBK
0046  0000  BOOTBO                        ** STORE AREA FOR BUILDING WORD
0047  0000  BOOTBA                        ** LOWER ORDER OF WORD
0050  0000  BOOTBB                        HIGH ORDER OF WORD
0051  0000  BOOTBC                        ** STORE AREA FOR BUILDING WORD
0052  0000  BOOTBD                        ** AREA FOR STORING WORD
0053  0000  BOOTBE                        ** CROSSING OF BANK
0054  0000  BOOTBF                        ** START ADDRESS OF INPUT
0055  0000  BOOTBG                        ** TEST FOR COMPETATION
0056  0020  BOOTB       LDN
0057  0001                        1
0060  0102              ATT       T1
0061  0020              LDN
0062  0016                        16
0063  0202              ATT       T2
0064  0122  BOOTB1      LDI       T1      ** ADDRESS OF NEXT CHARACTER
0065  0054                        BOOTBF
0066  0041              STM
0067  0047                        BOOTBA
0070  0041              STM
0071  0050                        BOOTBB
0072  0010              LPN
0073  0020                        20
0074  0061              NZP
0075  0133                        BOOTB6
0076  0021  BOOTB2      LDM                 ** LOWER ORDER OF WORD
0077  0047                        BOOTBA
0100  0010              LPN
0101  0017                        17
0102  0015              LSM
0103  0051                        BOOTBC
0104  0242  BOOTB3      STI       T2      ** STORE BUILT CHARACTER
0105  0052                        BOOTBD
0106  0055              RAO
0107  0052                        BOOTBD
0110  0060              ZJP
0111  0165                        BOOTB7
0112  0021              LDM
0113  0055                        BOOTBG
0114  0061              NZP
```

```
0115  0175                        BOOTB8
0116  0021  BOOTB4       LDM             ** TEST IF CROSSING BANK
0117  0053                        BOOTBE
0120  0061                NZP
0121  0126                        BOOTB5
0122  0055                RAO
0123  0054                        BOOTBF
0124  0064                UJP
0125  0064                        BOOTBI
0126  0003  BOOTB5       TTA             ** CROSSING OF BANK
0127  0041                STM
0130  0053                        BOOTBE
0131  0064                UJP
0132  0064                        BOOTBI
0133  0021  BOOTB6       LDM             ** HIGH ORDER OF CHARACTER
0134  0050                        BOOTBB
0135  0010                LPN
0136  0017                        17
0137  0001                SHA
0140  0001                SHA
0141  0001                SHA
0142  0001                SHA
0143  0041                STM
0144  0051                        BOOTBC
0145  0055                RAO
0146  0054                        BOOTBF
0147  0061                NZP
0150  0064                        BOOTBI
0151  0121                LDM     T1
0152  0377                        377
0153  0041                STM
0154  0047                        BOOTBA
0155  0103                TTA     T1
0156  0030                ADN
0157  0001                        1
0160  0102                ATT     T1
0161  0055                RAO
0162  0053                        BOOTBE
0163  0064                UJP
0164  0076                        BOOTB2
0165  0020  BOOTB7       LDN             ** SET STORE AREA TO 377
0166  0377                        377        FOR NEXT CHARACTER
0167  0041                STM
0170  0052                        BOOTBD
0171  0055                RAO
0172  0055                        BOOTBG
0173  0064                UJP
0174  0116                        BOOTB4
```

```
0175  0020   BOOTB8      LDN              ** SET TAG2 FOR JUMP
0176  0015                      15          EXIT TO PROGRAM CALL
0177  0202               ATT    T2
0200  0264               UJP    T2
0201  7777                      CALL
```

BOOTCH and BOOTC FORMAT



BOOTCH BANK-0 THE FIRST 45 (OCTAL) LOCATIONS ARE 6-BIT WORDS. BANK 0, FROM 56 (OCTAL) TO 376 OF BANK 2, THEY ARE 4-BIT WORDS WITH THE HIGH ORDER FOR AN 8-BIT WORD BEING IDENTIFIED BY BIT POSITION 4.

BANK 15 DPTT LPFT I/O AREA
AFTER, THE 4-BIT WORDS ARE ASSEMBLED INTO 8-BIT WORDS

N Nicholas

BOOTCH AND BOOTC

I. Function

A. General

To store the remaining part of the program DPTT along with the program LDFT into bank 15, then will exit to Program CALL.

B. Detail

BOOTCH and BOOTC is the last record of the BOOT STRAP which was loaded into the 8092B core by program CALL starting with address zero of bank zero.

BOOTCH is a set of six bit per word instructions, when executed, it builds a set of eight bit per word instructions from two four bit words. This becomes program BOOTC.

BOOTC will take remaining four bit words, combine the high and the low orders to build and eight bit word and stores them into bank 15. These eight bit words are program instructions belonging to DPTT and LPFT. Then it will exit to program CALL.

II. Control Tags

TAG 1. Used while combining the high and the low order of each word before storing.

TAG 2. First set to bank 15 to be used while storing programs DPTT and LPFT, then set for the exit to program CALL.

III. Control Words

BOOTCO Temporary storage for the building of the eight bit word.

BOOTCA Lower order of the eight bit word.

BOOTCB High order of the eight bit word.

BOOTCC Temporary storage for the building of the eight bit word.

BOOTCD Address for storing DPTT and LPFT.

BOOTCE Crossings of a bank.

BOOTCF Starting address of the four bit words.

BOOTCG Flag test for completion of storing DPTT and LPFT to their proper bank.

IV. Entry Point

BOOTCH

V. Exits

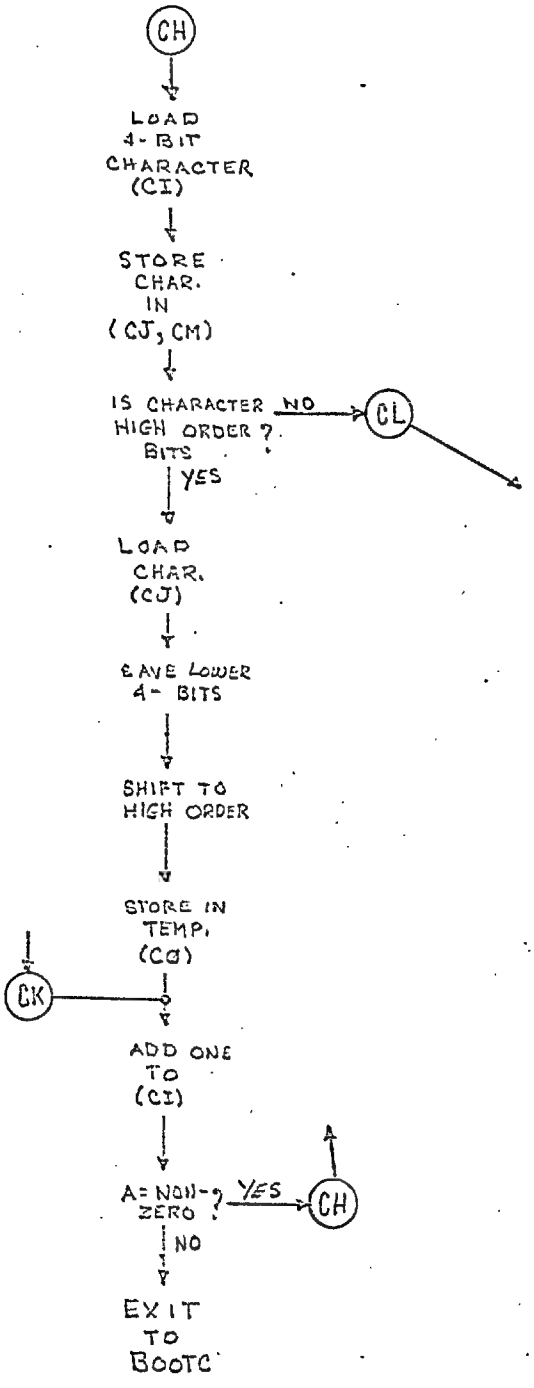
To program CALL

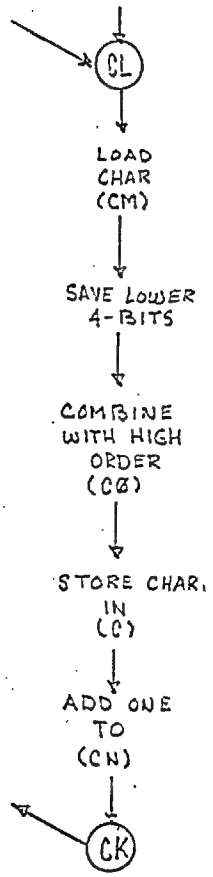
Program Name

Bootch

IT ASSEMBLES A PROGRAM TO WORK WITH TAGS

PROGRAM CONTROL WORDS	
BootCI	START ADDRESS OF 4-BIT WORDS
" " CJ	HIGH ORDER OF WORD
" " CM	LOW ORDER OF WORD
" " CØ	TEMPORARY STORAGE
" " CN	START ADDRESS OF 2BIT WORDS
" " C	START OF PROGRAM BootC





R. Nicholas

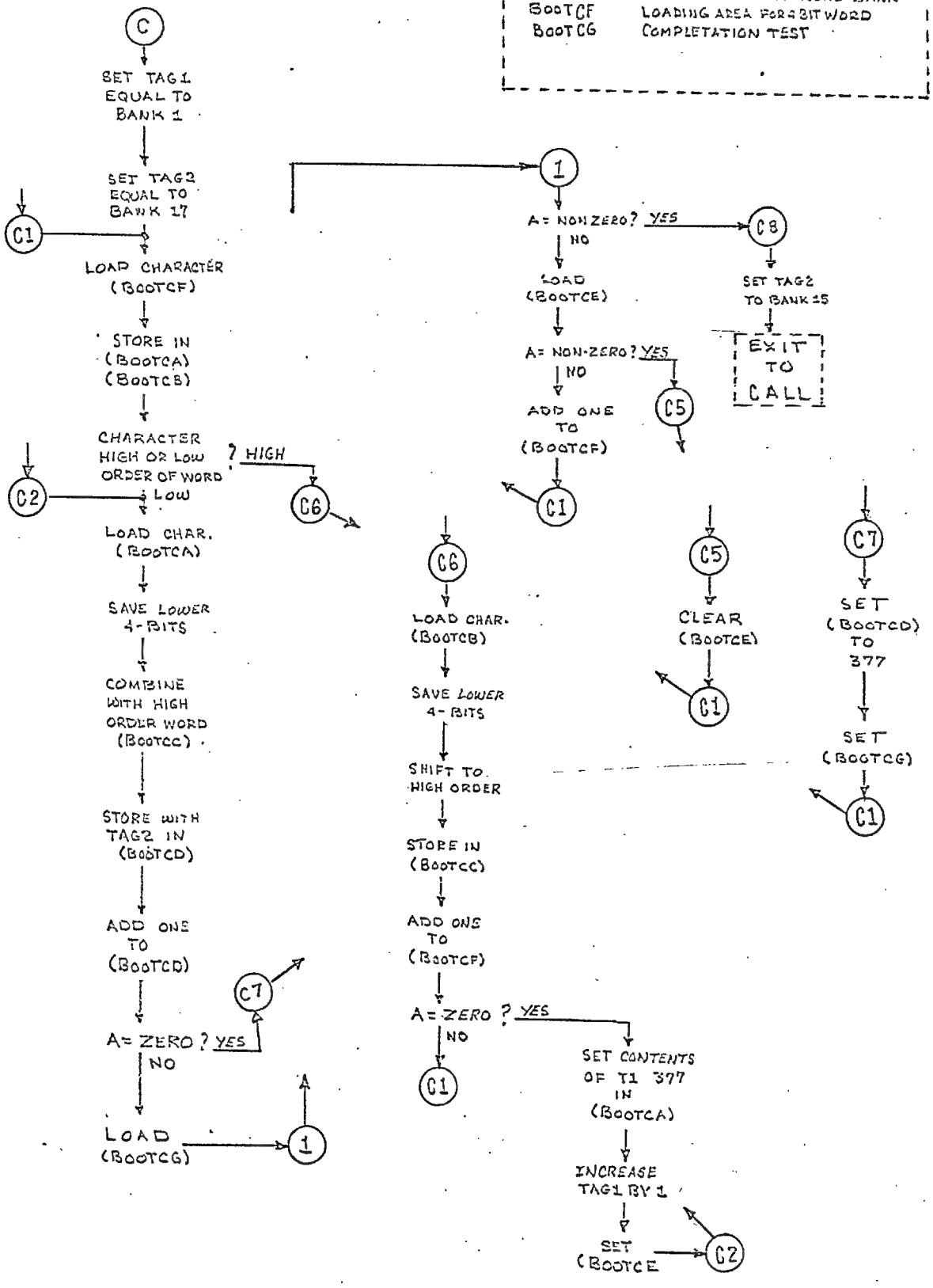
PROGRAM NAME

BOOTC

ASSEMBLES PROGRAMS DPTT AND LDFT
STORES THEM IN BANK 17

PROGRAM CONTROL WORDS

BOOTCA	LOW ORDER OF 4 BIT WORD
BOOTCB	HIGH ORDER OF 4 BIT WORD
BOOTCC	TEMPORARY STORING BUILDING WORD
BOOTCD	AREA FOR STORING 8 BIT WORD
BOOTCE	CROSSING A 4 BIT WORD BANK
BOOTCF	LOADING AREA FOR 8 BIT WORD
BOOTCG	COMPLETATION TEST



N. Nicholas

```
0000          PRG          0
                                                  ***************
                                              ******* PROGRAM NAMES ******
                                              *                           *
                                              *        BOOTCH             *
                                              *                           *
                                              * 6BIT INSTRUCTION PROGRAM *
                                              *    ASSEMBLES AND  8BIT   *
                                              *    INSTRUCTION PROGRAM   *
                                              *      CALLED BOOTC        *
                                              *                           *
                                              *        BOOTC              *
                                              *                           *
                                              * 8BIT INSTRUCTION PROGRAM *
                                              *    ASSEMBLES AND  8BIT   *
                                              *    INSTRUCTION  WORD     *
                                              *    STORES THEM IN HIGH   *
                                              ******     CORE        ******
                                                  ***************
0000  0021  BOOTCH     LDM
0001  0056  BOOTCI             BOOTC
0002  0041             STM
0003  0013                     BOOTCJ
0004  0041             STM
0005  0033                     BOOTCM
0006  0010             LPN
0007  0020                     20
0010  0060             ZJP
0011  0032                     BOOTCL
0012  0020             LDN
0013  0000  BOOTCJ                     ** LOAD HIGH ORDER WORD
0014  0010             LPN
0015  0017                     17
0016  0001             SHA
0017  0001             SHA
0020  0001             SHA
0021  0001             SHA
0022  0041             STM
0023  0046                     BOOTCO
0024  0055  BOOTCK     RAO             ** INCREASE START ADDRESS BY ONE
0025  0001                     BOOTCI
0026  0061             NZP
0027  0000                     BOOTCH
0030  0064             UJP
0031  0056                     BOOTC
0032  0020  BOOTCL     LDN             ** LOAD LOW ORDER OF WORD
0033  0000  BOOTCM                     ** PRESTORED WORD
0034  0010             LPN
```

```
0035  0017                        17
0036  0015              LSM
0037  0046                        BOOTC0
0040  0041              STM
0041  0056  BOOTCN                BOOTC   ** STORE WORD INCREASE
0042  0055              RAO                   STORE AREA BY ONE
0043  0041                        BOOTCN
0044  0064              UJP
0045  0024                        BOOTCK
0046  0000  BOOTC0                       ** STORE AREA FOR BUILDING WORD
0047  0000  BOOTCA                       ** LOWER ORDER OF WORD
0050  0000  BOOTCB                       ** HIGH ORDER OF WORD
0051  0000  BOOTCC                       ** STORE AREA FOR BUILDING WORD
0052  0000  BOOTCD                       ** AREA FOR STORTING WORD
0053  0000  BOOTCE                       ** CROSSING A BANK
0054  0000  BOOTCF                       ** START ADDRESS OF INPUT
0055  0000  BOOTCG                       ** TEST FOR COMPLETATION
0056  0020  BOOTC       LDN
0057  0001                        1
0060  0102              ATT       T1
0061  0020              LDN
0062  0017                        17
0063  0202              ATT       T2
0064  0122  BOOTC1      LDI       T1      ** ADDRESS OF NEXT CHARACTER
0065  0054                        BOOTCF
0066  0041              STM
0067  0047                        BOOTCA
0070  0041              STM
0071  0050                        BOOTCB
0072  0010              LPN
0073  0020                        20
0074  0061              NZP
0075  0133                        BOOTC6
0076  0021  BOOTC2      LDM               ** LOWER ORDER OF WORD
0077  0047                        BOOTCA
0100  0010              LPN
0101  0017                        17
0102  0015              LSM
0103  0051                        BOOTCC
0104  0242  BOOTC3      STI       T2      ** STORE BUILT CHARACTER
0105  0052                        BOOTCD
0106  0055              RAO
0107  0052                        BOOTCD
0110  0060              ZJP
0111  0165                        BOOTC7
0112  0021              LDM
0113  0055                        BOOTCG
0114  0061              NZP
```

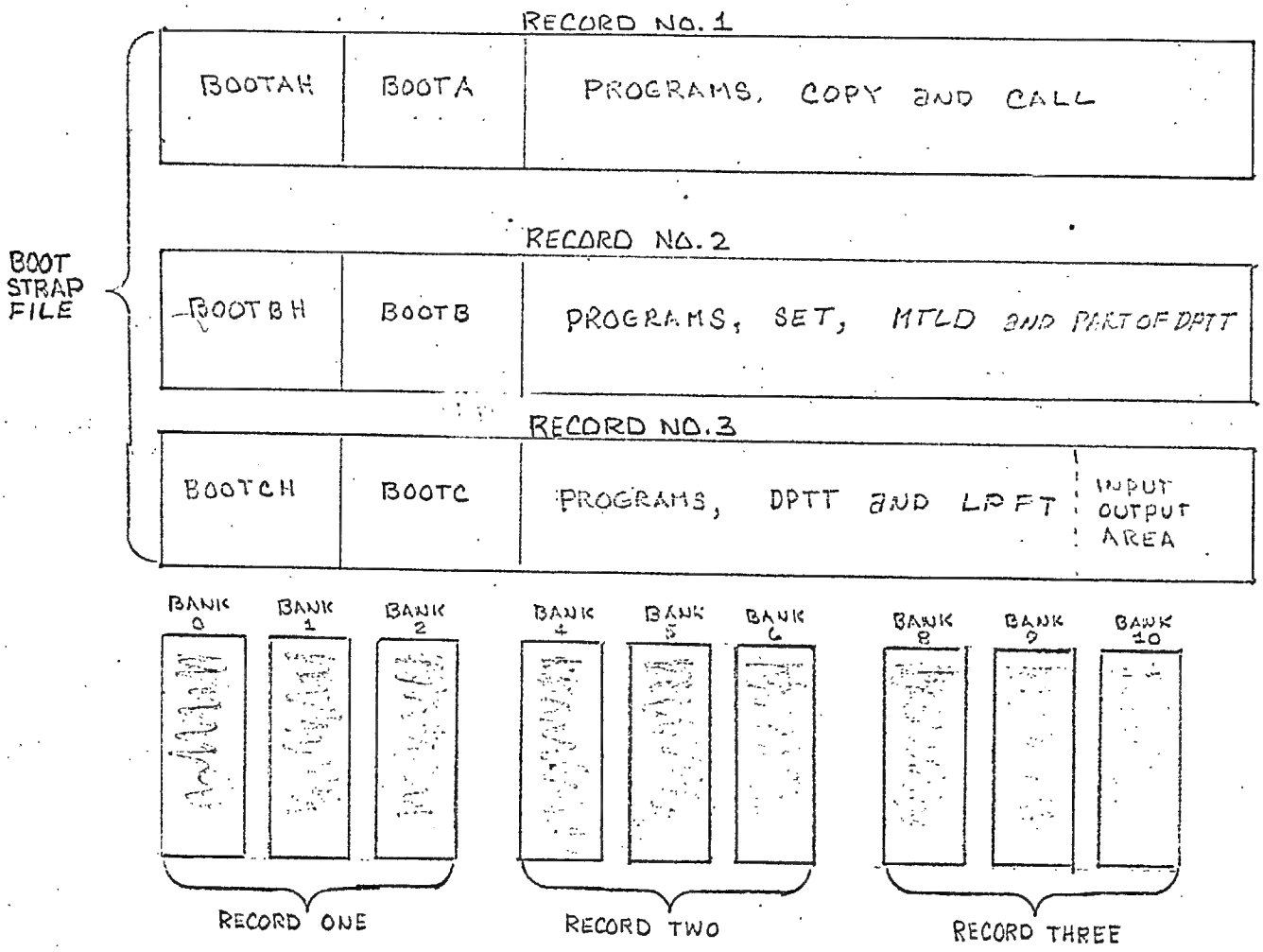
```
0115  0175                        BOOTC8
0116  0021  BOOTC4       LDM             ** TEST IF CROSSING BANKS
0117  0053                        BOOTCE
0120  0061                NZP
0121  0126                        BOOTC5
0122  0055                RAO
0123  0054                        BOOTCF
0124  0064                UJP
0125  0064                        BOOTCI
0126  0003  BOOTC5       TTA             ** CROSSING OF A BANK
0127  0041                STM
0130  0053                        BOOTCE
0131  0064                UJP
0132  0064                        BOOTCI
0133  0021  BOOTC6       LDM             ** HIGH ORDER OF CHARACTER
0134  0050                        BOOTCB
0135  0010                LPN
0136  0017                        17
0137  0001                SHA
0140  0001                SHA
0141  0001                SHA
0142  0001                SHA
0143  0041                STM
0144  0051                        BOOTCC
0145  0055                RAO
0146  0054                        BOOTCF
0147  0061                NZP
0150  0064                        BOOTCI
0151  0121                LDM     T1
0152  0377                        377
0153  0041                STM
0154  0047                        BOOTCA
0155  0103                TTA     T1
0156  0030                ADN
0157  0001                        1
0160  0102                ATT     T1
0161  0055                RAO
0162  0053                        BOOTCE
0163  0064                UJP
0164  0076                        BOOTC2
0165  0020  BOOTC7       LDN             ** SET STORE AREA TO 377
0166  0377                        377        FOR NEXT CHARACTER
0167  0041                STM
0170  0052                        BOOTCD
0171  0055                RAO
0172  0055                        BOOTCG
0173  0064                UJP
0174  0116                        BOOTC4
```

```
0175  0020   BOOTC8      LDN                  ** SET TAG2 FOR JUMP
0176  0015                        15             EXIT TO PROGRAM CALL
0177  0202               ATT      T2
0200  0264               UJP      T2
0201  7777                        CALL
```

PROGRAM COPY

FORMAT

AUTOMATIC LOAD AND DUMP TAPE



FROM → AUTOMATIC LOAD AND DUMP TAPE

READS RECORD ONE INTO BANKS 0,1 AND 2. READS RECORD TWO INTO BANKS 4,5 AND 6
READS RECORD THREE INTO BANKS 8,9 AND 10.

TO NEW MAGNETIC TAPE

OUTPUTS BANKS 0,1 AND 2 (RECORD ONE) OUTPUTS BANKS 4,5 AND 6 (RECORD TWO)
OUTPUTS BANKS 8,9 AND 10 (RECORD THREE). WRITES EOF AND CODE MARK (77)

THE TAPE IS NOW AN AUTOMATIC LOAD AND DUMP TAPE.

N Nicholas

COPY

I. Function

A. General

Generates the BOOT STRAP for a new Automatic Load and Dump Tape.

B. Detail

Reads the three records of the BOOT STRAP into the 8092B core on the buffer channel. Record one of the BOOT STRAP is stored starting with zero of bank 0, to word 377 of bank 2. Record two is stored starting with word zero of bank 4, to word 377 of bank 6. Record three is stored starting with word zero of bank 8, to word 377 of bank 10. Then the program halts, so a new tape can be mounted on unit 3.

COPY writes the three records (which were stored into the 8092B core) on the buffer channel to the magnetic tape, that was mounted on unit 3, in the same sequence that they were inputted. Then it writes an end of file mark and code mark (77 octal). This tape is now a new Automatic Load and Dump Tape.

II. TAGS

TAG1 NOT USED.
TAG2 Programs execution tag.
TAG3 Used for input and output of the BOOT STRAP.

III. CONTROL WORDS

COPY A Counter for parity error while reading or writing.
COPY B Times counter of 3, for input and output.
COPY C Times counter of 2, for input and outputting the three records, just once.
COPY 4 Prestored number to increase Tag 3.
COPY 7 Prestored code for reading or writing.
COPY 8 Prestored code for inputting or outputting.

IV. ENTRY POINTS

COPY Entry point for program CALL.

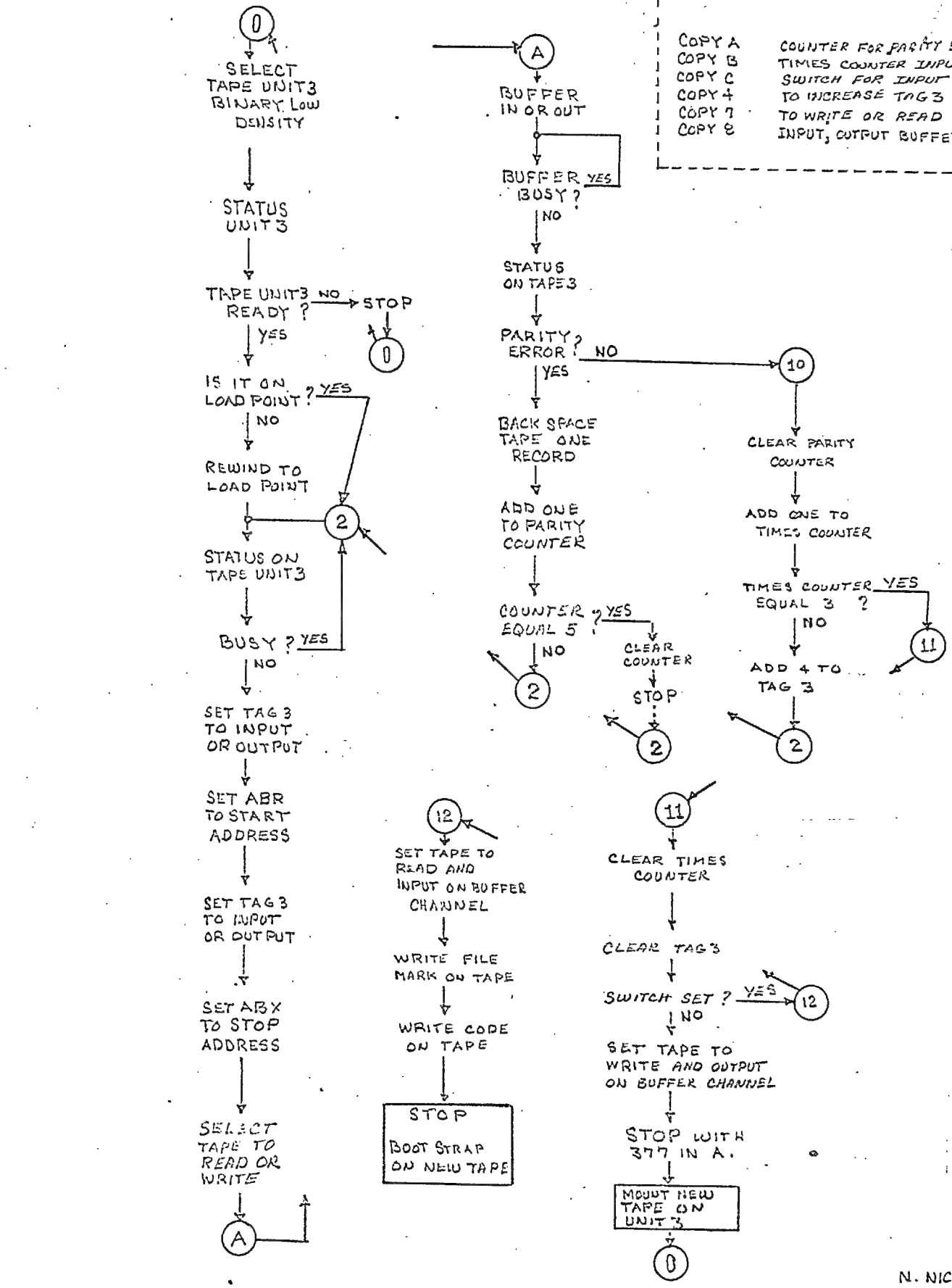
EXIT

NONE.

PROGRAM NAME

COPY

COPY BOOT STRAP ON TAPE



PROGRAM CONTROL WORDS

COPY A	COUNTER FOR PARITY ERRORS
COPY B	TIMES COUNTER INPUT, OUTPUT
COPY C	SWITCH FOR INPUT OUTPUT
COPY 4	TO INCREASE TAG 3
COPY 7	TO WRITE OR READ DATA
COPY 8	INPUT, OUTPUT BUFFER CHANNEL

N. NICHOLAS

```
                    SUPB
     6400           PRG          6400
                                                  **************
                                                *** PROGRAM NAME ***
                                                *                  *
                                                *       COPY       *
                                                *                  *
                                                * IT GENERATES THE *
                                                * BOOT STRAP ON A  *
                                                *     NEW TAPE     *
                                                ***              ***
                                                  **************
6400  0075  COPY        EXF
6401  0013                     TAPE3
6402  0011                     SOL
6403  0075              EXF
6404  0013                     TAPE3
6405  0000                     RSO
6406  0076              INA
6407  0010              LPN
6410  0042                     42
6411  0034              SBN
6412  0040                     40
6413  0260              ZJP    T2
6414  6427                     COPY2
6415  0030              ADN
6416  0040                     40
6417  0260              ZJP    T2
6420  6424                     COPY1
6421  0077              HLT
6422  0264              UJP    T2
6423  6400                     COPY   **TAPE UNIT 3 NOT READY
6424  0075  COPY1       EXF           **REWIND TAPE UNIT 3 LOAD POINT
6425  0013                     TAPE3
6426  0034                     RWL
6427  0075  COPY2       EXF           **TAKE STATUS OF TAPE UNIT 3
6430  0013                     TAPE3
6431  0000                     RSO
6432  0076              INA
6433  0263              NJP    T2
6434  6427                     COPY2
6435  0020              LDN
6436  0000  COPY4              0      **SET T3 FOR INPUT OUTPUT F.W.T.
6437  0302              ATT    T3
6440  0020              LDN
6441  0000                     0
6442  0204  COPY5       ABR    T2     **IF BUSY, KEEP TRYING TO ENTER STAR
6443  6442                     COPY5  ADDRESS FOR INPUT OR OUTPUT
```

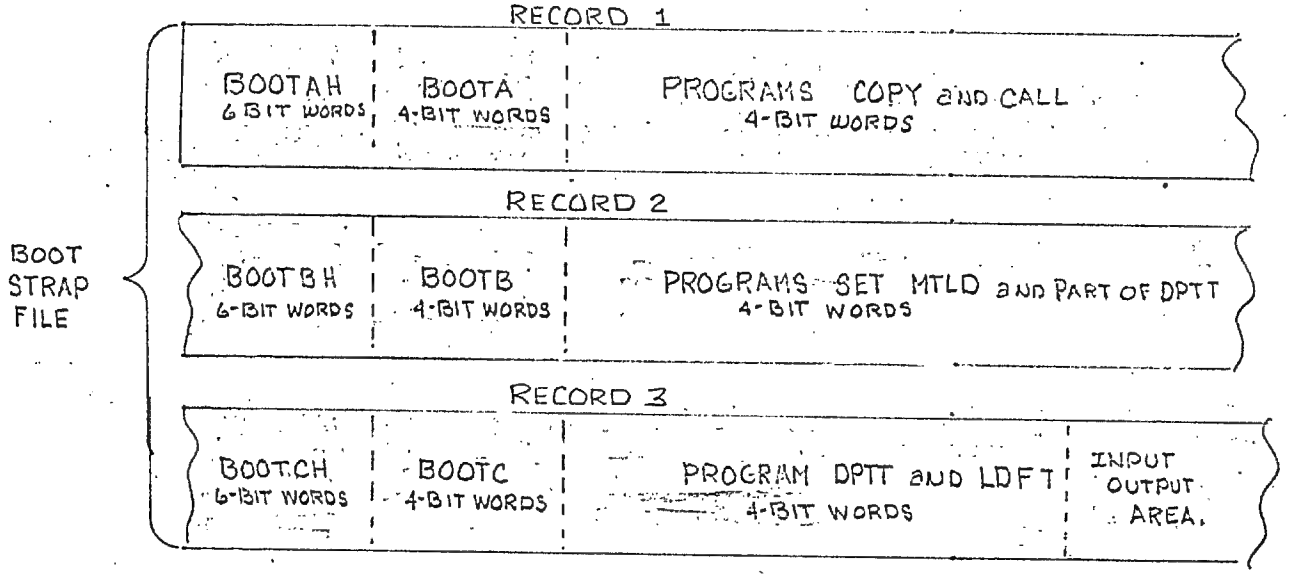
```
6444  0303              TTA     T3
6445  0030              ADN
6446  0003                      3
6447  0302              ATT     T3
6450  0020              LDN
6451  0002                      2
6452  0205  COPY6       ABX     T2      **IF BUSY, KEEP TRYING TO ENTER STOP
6453  6452                      COPY6   ADDRESS FOR INPUT OR OUTPUT
6454  0075              EXF
6455  0013                      TAPE3
6456  0024  COPY7               READ    **THIS CHANGES TO READ AND WRITE
6457  0270  COPY8       IBI     T2      **THIS CHANGES TO INPUT OR OUTPUT
6460  6457                      COPY8
6461  0020              LDN             BUFFER CHANNEL IBI, IBO
6462  0000                      0
6463  0204  COPY9       ABR     T2      **TEST POINT FOR COMPLETION OF BUFFEI
6464  6463                      COPY9
6465  0075              EXF
6466  0013                      TAPE3
6467  0000                      RSO
6470  0076              INA
6471  0010              LPN
6472  0004                      4
6473  0260              ZJP     T2
6474  0513                      COPY10
6475  0075              EXF
6476  0013                      TAPE3
6477  0031                      SBR
6500  0255              RAO     T2
6501  6606                      COPYA
6502  0034              SBN
6503  0005                      5
6504  0261              NZP     T2
6505  6427                      COPY2
6506  0241              STM     T2
6507  6606                      COPYA
6510  0077              HLT
6511  0264              UJP     T2
6512  6427                      COPY2
6513  0241  COPY10      STM     T2      **CLEAR PARITY CHECK COUNTER
6514  6606                      COPYA
6515  0255              RAO     T2
6516  6607                      COPYB
6517  0034              SBN
6520  0003                      3
6521  0260              ZJP     T2
6522  6531                      COPY11
6523  0020              LDN
```

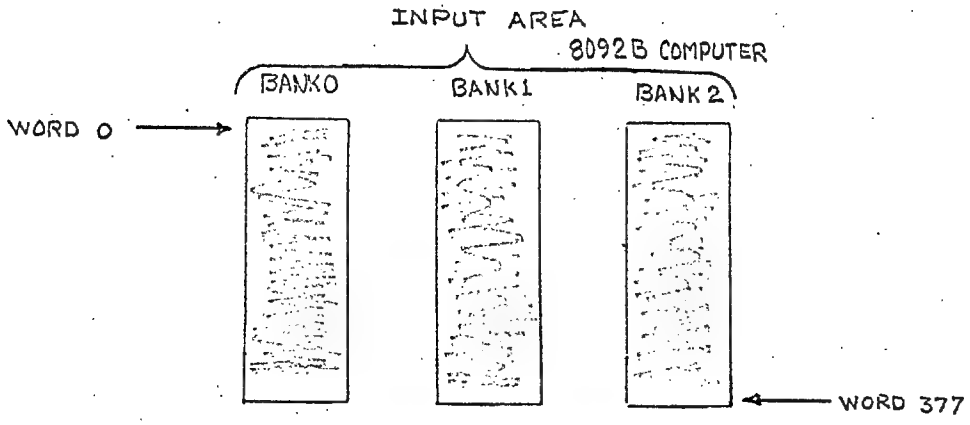
```
6524  0004                        4
6525  0251            RAM         T2
6526  6436                        COPY4
6527  0264            UJP         T2
6530  6427                        COPY2
6531  0241  COPYII     STM         T2      **CLEAR TIMES COUNTER, FOR INPUT
6532  6607                        COPYB   ON OUTPUT
6533  0241            STM         T2
6534  6436                        COPY4
6535  0221            LDM         T2
6536  6610                        COPYC
6537  0001            SHA
6540  0241            STM         T2
6541  6610                        COPYC
6542  0263            NJP         T2
6543  6564                        COPYI2
6544  0020            LDN
6545  0271            IBO         T2
6546  0241            STM         T2
6547  6457                        COPY8
6550  0020            LDN
6551  0020                        WRT
6552  0241            STM         T2
6553  6456                        COPY7
6554  0075            EXF
6555  0013                        TAPE3
6556  0035                        RWU
6557  0020            LDN
6560  0377                        377
6561  0077            HLT                 **PUT NEW TAPE ON UNIT 3 AND RUN
6562  0264            UJP         T2
6563  6400                        COPY
6564  0020  COPYI2     LDN                 **SET COPY 4 TO INPUT ON BUFFER
6565  0270            IBI         T2
6566  0241            STM         T2
6567  6457                        COPY8
6570  0020            LDN
6571  0024                        READ
6572  0241            STM         T2
6573  6456                        COPY7
6574  0075            EXF
6575  0013                        TAPE3
6576  0021                        WFM
6577  0075            EXF
6600  0013                        TAPE3
6601  0020                        WRT
6602  0074            OTN
6603  0077                        77
```

```
6604  0003                TTA
6605  0077                HLT           **BOOT STRAP ON NEW TAPE UNIT 3
6606  0000  COPYA                       **COUNTER FOR PARITY CHECK
6607  0000  COPYB                       **TIMES COUNTER FOR INPUT OUTPUT
6610  0252  COPYC              252      **SWITCH FOR READING OR WRITING
```

PROGRAM CALL FORMAT

AUTOMATIC LOAD AND DUMP TAPE





RECORD TWO IS INPUTTED FIRST THEN PROCESSED BY PROGRAM BOOTBH.
RECORD THREE IS INPUTTED AND PROCESSED BY PROGRAM BOOTCH.

BOTH RECORDS START IN BANK 0 WORD 0 AND END IN BANK 2 WORD 377.

CALL

I. Function

A. General

CALL brings in records two and three of the BOOT STRAP into the 8092B Core for processing.

B. Detail

The buffer channel is used to input the records. The input area starts with word zero of bank zero and ends with word 377 octal of bank two. Record two is inputed first, then CALL releases control to BOOTBH for the processing of record two from the BOOTSTRAP file.

When the processing of record two is completed BOOTBH will return control back to program CALL. CALL will input record three of the BOOT STRAP in the same manner as record two. Control is than returned to BOOTCH for the processing of record three. BOOTCH will return control to program CALL when the processing is completed.

A parity check is made on both of the records. CALL then comes to a halt to indicate that the BOOT STRAP is now loaded and ready for its job assignments. The job assignment are indicated by entering a parameter in to the A-REGISTER.

The parameter is divided into four bit indicaters. The high order four bits are for coping the BOOT STRAP or to dump a program from the 8092B Core to the Automatic Load and Dump Tape. The low order bits indicates the file number on the Automatic Load and Dump Tape either for the loading on the dumping of the 8092B core.

DUMP OR COPY HIGH	FILE NUMBER LOW	Parameter job assignments
17	0	Generates a new Automatic Load any Dump Tape.
XX	0	Dumping of the 8092B Core to the Automatic Load and Dump Tape.
XX	YY	
0	YY	Loading the 8092B core from the Automatic Load and Dump Tape.

II. TAGS

TAG1 Exit tag to programs BOOTBH and BOOTCH

TAG2 Programs execution tag, also exit tag to Programs SET and COPY

TAG3 Records two and three input tag.

III. Control Words

CALLA Switch Counter for inputting only two records

CALLB Parity error counter

CALL10 Job assignment word.

IV. Entry Point

CALL

V. Exits

BOOTBH

BOOTCH

SET

COPY

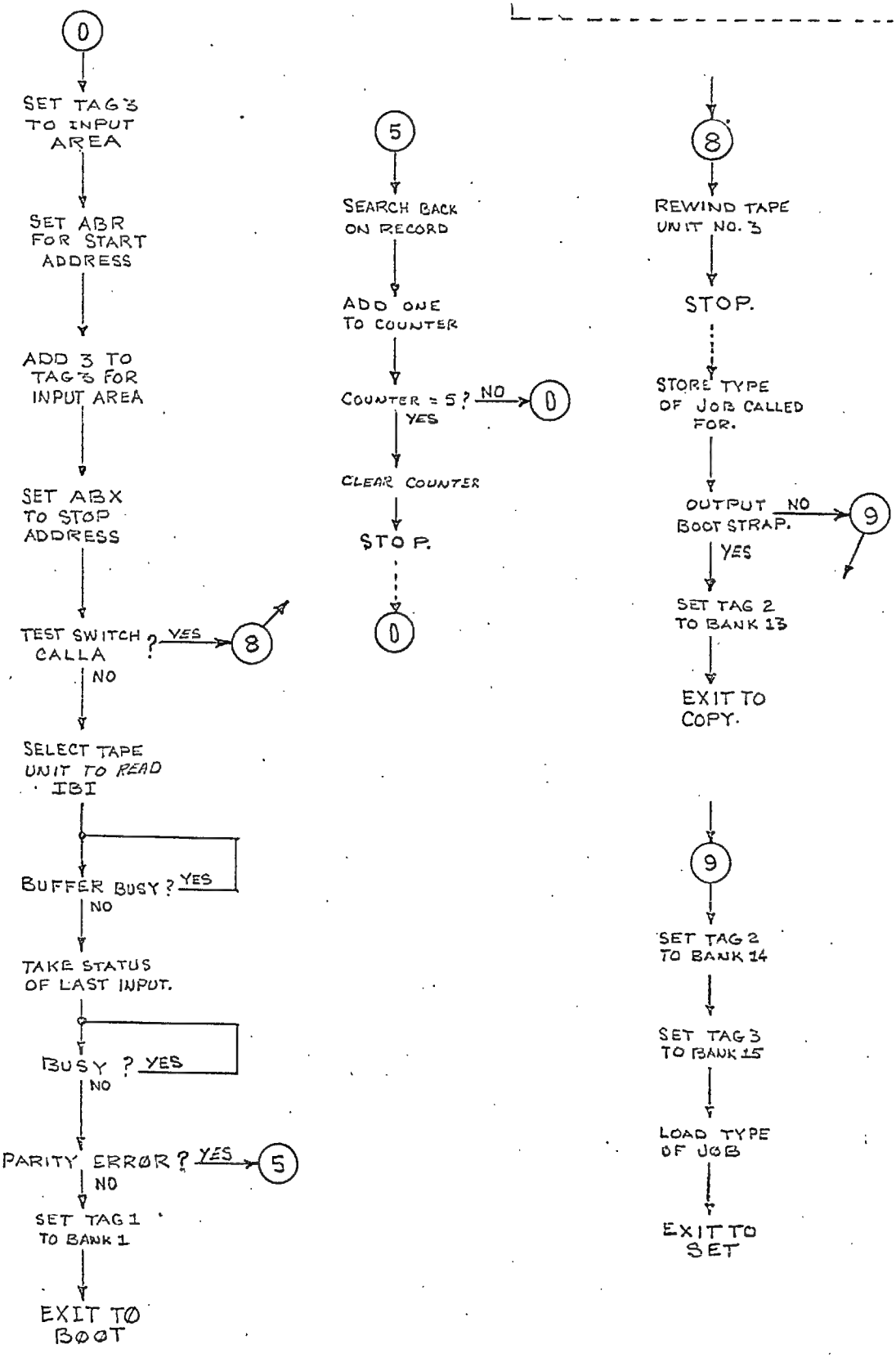
PROGRAM NAME

CALL

CALL BOOT STRAPS 2 and 3

PROGRAM CONTROL WORDS

CALL A — SWITCH TEST, FOR BOOT STRAP
CALL B — PARITY ERROR COUNTER
CALL 10 — FILE NO. CALLED FOR



N. Nicholas

```
                                                    **************
                                                 *** PROGRAM NAME ****
                                                 *                   *
                                                 *      CALL         *
                                                 *                   *
                                                 * BRINGS IN BOOTBH  *
                                                 * AND BOOTCH OFF OF *
                                                 *      TAPE         *
                                                 * TO COMPLETE THE   *
                                                 * LOADING OF THE    *
                                                 *   BOOT STRAP      *
                                                 ***              ****
                                                    **************
6611  0020   CALL        LDN
6612  0000                       0
6613  0302               ATT     T3
6614  0204   CALL1       ABR     T2      **SET START ADDRESS FOR INPUT
6615  6614                       CALL1
6616  0030               ADN
6617  0003                       3
6620  0302               ATT     T3
6621  0020               LDN
6622  0002                       2
6623  0205   CALL2       ABX     T2      **SET STOP ADDRESS FOR INPUT
6624  6623                       CALL2
6625  0221               LDM     T2
6626  6744                       CALLA
6627  0001               SHA
6630  0241               STM     T2
6631  6744                       CALLA
6632  0263               NJP     T2
6633  6712                       CALL8
6634  0075               EXF
6635  0013                       TAPE3
6636  0024                       READ
6637  0270   CALL2A      IBI     T2       ** READ NEXT RECORD FROM BOOT STRAP
6640  6637                       CALL2A
6641  0020               LDN
6642  0000                       0
6643  0204   CALL3       ABR     T2      **WAIT TILL BUFFER IS COMPLETED
6644  6643                       CALL3
6645  0075   CALL4       EXF             **STATUS OF LAST INPUT
6646  0013                       TAPE3
6647  0000                       RSO
6650  0076               INA
6651  0263               NJP     T2
6652  6645                       CALL4
6653  0010               LPN
```

```
6654  0004                        4
6655  0261              NZP       T2
6656  6664                        CALL5
6657  0241              STM       T2
6660  6745                        CALLB
6661  0102              ATT       T1
6662  0164              UJP       T1
6663  0000                        0
6664  0075  CALL5       EXF             ** BACK SPACE ON RECORD
6665  0013                        TAPE3
6666  0031                        SBR
6667  0255              RAO       T2
6670  6745                        CALLB
6671  0034              SBN
6672  0005                        5
6673  0260              ZJP       T2
6674  6705                        CALL7
6675  0075  CALL6       EXF             ** STATUS OF TAPE UNIT3
6676  0013                        TAPE3
6677  0000                        RSO
6700  0076              INA
6701  0263              NJP       T2
6702  6675                        CALL6
6703  0264              UJP       T2
6704  6611                        CALL
6705  0241  CALL7       STM       T2      ** CLEAR PARITY COUNTER
6706  6745                        CALLB
6707  0077              HLT
6710  0264              UJP       T2
6711  6675                        CALL6
6712  0075  CALL8       EXF             ** REWIND TAPE3 TO LOAD POINT
6713  0013                        TAPE3
6714  0034                        RWL
6715  0003              TTA
6716  0077              HLT
6717  0241              STM       T2
6720  6741                        CALL10
6721  0034              SBN
6722  0360                        360
6723  0261              NZP       T2
6724  6732                        CALL9
6725  0020              LDN
6726  0015                        15
6727  0202              ATT       T2
6730  0264              UJP       T2
6731  6400                        COPY
6732  0020  CALL9       LDN             ** SET BANKS IN TAG2 AND TAG3
6733  0016                        16
```

```
6734  0202              ATT     T2
6735  0030              ADN
6736  0001                      1
6737  0302              ATT     T3
6740  0020              LDN
6741  0000  CALLIO                     ** PRESTORE, LOADING OR DUMPING FILE
6742  0264              UJP     T2
6743  7001                      SET
6744  0022  CALLA              22      ** SWITCH TEST, FOR BOOTSTRAP.
6745  0000  CALLB                      ** PARITY ERROR COUNTER.
```

SET

I. Function

A. General

Executive program for the reading or the writing of the Automatic Load and Dump Tape for the 8092B core.

B. Detail

SET determines the job assignment by analyzing a "job Parameter" manually entered into A-register prior to execution. This "job parameter" is structured into two four bit indicators. The high order four bits are "bank" indicators, the low order four bits are "file" indicators.

The job assignment and job parameters can be derived from this "job parameters" as follows:

BANK	FILE	JOB ASSIGNEMENT AND PARAMETERS
0	YY	- Load file YY from Automatic Load and Dump Tape.
XX	00	- Dump 8092B core bank zero to bank XX and place on Automatic Load and Dump Tape as last file.
XX	YY	- Dump 8092B Core bank zero to bank XX and place on Automatic Load and Dump Tape as file YY.

NOTE: XX must be less than 17.

If the job assignment is dumping SET will: a) determine if the file to be dumped updates an existing file and set up the number of the file to be update b) determine if the file to be dumped is a new file to be added to the tape. It sets the control words for the last bank to be outputted and if the end of file mark and code mark octal 77, is to be put on the Automatic Load and Dump Tape to indicate the last file.

If the job assignment is loading, SET will determine the number of the file on magnetic tape to be loaded. It will clear the control word for the end of file and code mark.

SET initializes all control words, fixes program MTLD to either read or write and, exits to programs LPFT or DPTT depending on the job assignment.

II. TAGS

TAG1 Not used.

TAG2 Programs execution tag. Exit tag to program MTLD.

TAG3 Used for the inputting for a record, exit tag to program DPTT.

III. Control Words

AREA First word address of the input/output area.

NUMBER Number of the file record to be dumped.

FILE The file number for dumping or loading the 8092B Core.

LAST Last bank + 1 for dumping the 8092B Core.

NOEOF To determine if E.O.F. and Core mark is to be output.

BANK Crossing of the banks while loading or dumping the 8092B Core.

CKSUM The adding of the eight-bit words while loading or dumping the 8092B Core.

FLAG Indicates the last record of the file, for dumping the 8092B Core.

IV. Entry Points

SET

V. Exits

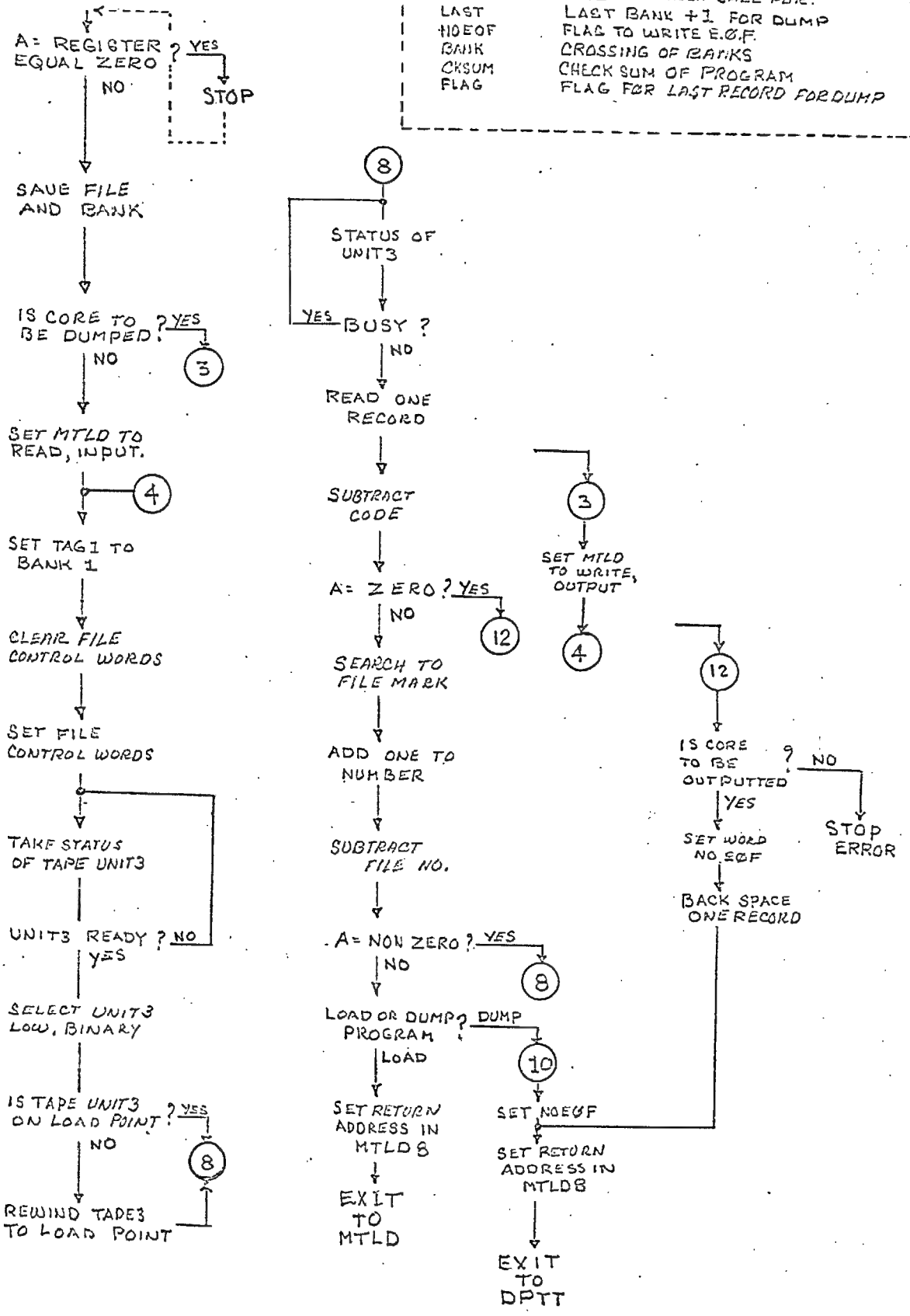
MTLD

DPTT

PROGRAM NAME

SET

SET TO A START CONDICTION



PROGRAM CONTROL WORDS

AREA	FIRST WORD ADDRESS
NUMBER	NUMBER OF FILE RECORDED
FILE	FILE NUMBER CALL FOR.
LAST	LAST BANK +1 FOR DUMP
NOEOF	FLAG TO WRITE E.O.F.
BANK	CROSSING OF BANKS
CKSUM	CHECK SUM OF PROGRAM
FLAG	FLAG FOR LAST RECORD FOR DUMP

M Nicholas

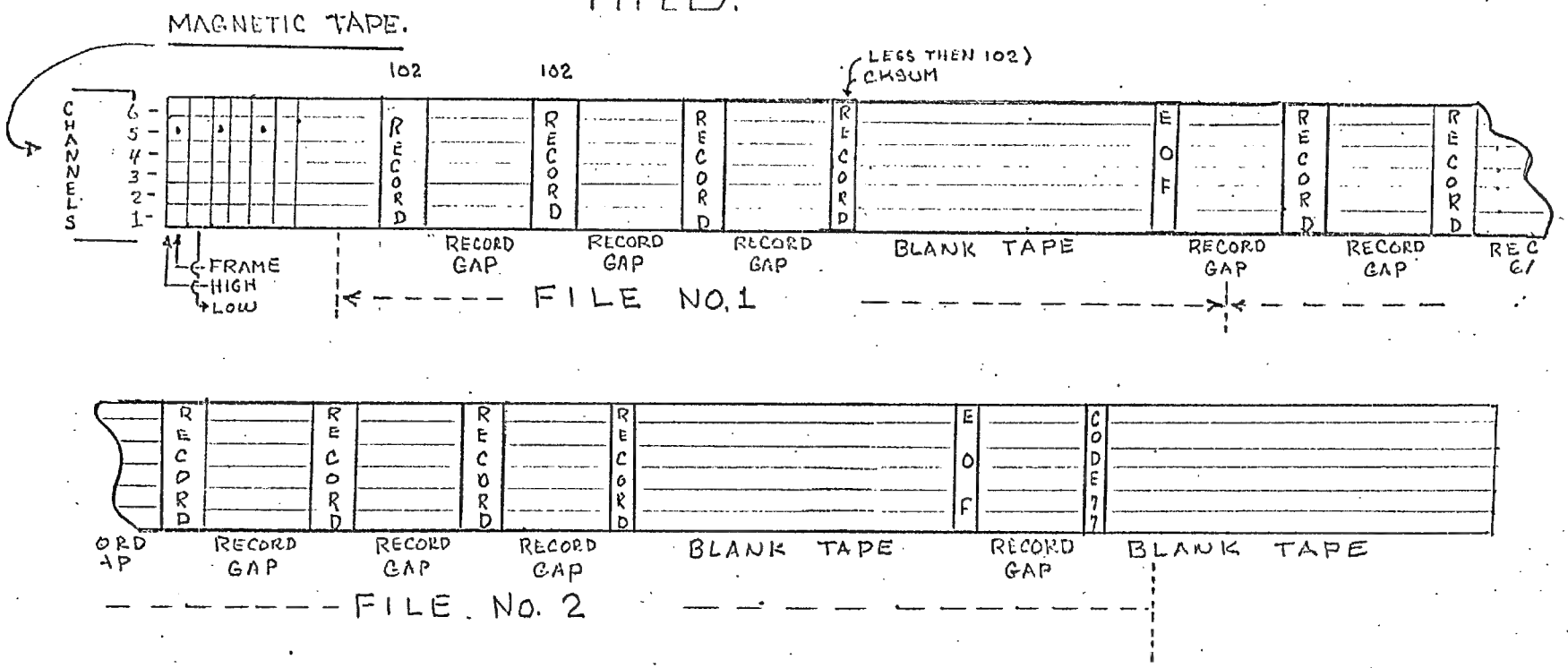
```
      7000          PRG          7000
                                                  ********************
                                                ******                ******
                                                *     PROGRAM  NAME  SET
                                                *                          *
                                                *  SET MTLD TO READ OR WRITE  *
                                                *  CLEAR AND SET DATA FILE TO *
                                                *      START CONDICTION      *
                                                ******                ******
                                                  ********************
7000  0000                          0
7001  0261   SET          NZP      T2
7002  7006                          SET1
7003  0077                 HLT              ** STOP A-REGISTER EQULS
                                               ZERO, NO JOB SPECIFIED.
                                               IF YOU WISH TO CONTINUE
                                               SPECIFIED JOB IN A-REGISTER
                                               AND RUN.
7004  0264                 UJP      T2
7005  7001                          SET
7006  0241   SET1         STM      T2       ** STORE LAST BANK
7007  7015                          SET2
7010  0010                 LPN
7011  0017                          17
7012  0241                 STM      T2
7013  7213                          FILE
7014  0020                 LDN
7015  0000   SET2
7016  0010                 LPN              ** STORE PROGRAM FILE NUMBER
7017  0360                          360
7020  0001                 SHA
7021  0001                 SHA
7022  0001                 SHA
7023  0001                 SHA
7024  0341                 STM      T3
7025  7664                          LAST
7026  0261                 NZP      T2
7027  7042                          SET3
7030  0020                 LDN
7031  0024                          READ
7032  0241                 STM      T2
7033  7232                          MTLD2
7034  0020                 LDN
7035  0372                          INNT3
7036  0241                 STM      T2
7037  7233                          MTLD3
7040  0264                 UJP      T2
7041  7052                          SET4
```

```
7042  0020  SET3    LDN          ** SET TAPE DRIVE TO WRITE
7043  0020               WRT
7044  0241         STM  T2
7045  7232               MTLD2
7046  0020         LDN
7047  0373               OUTT3
7050  0241         STM  T2
7051  7233               MTLD3
7052  0003  SET4    TTA          ** CLEAR AND SET DATA FILE WORDS
7053  0102         ATT  T1
7054  0341         STM  T3
7055  7660               BANK
7056  0341         STM  T3
7057  7566               LPFT3
7060  0341         STM  T3
7061  7661               CKSUM
7062  0341         STM  T3
7063  7665               FLAG
7064  0241         STM  T2
7065  7214               NUMBER
7066  0241         STM  T2
7067  7215               NOEOF
7070  0075  SET5    EXF          ** STATUS OF TAPE NO. 3
7071  0013               TAPE3
7072  0000               RSO
7073  0076         INA
7074  0241         STM  T2
7075  7111               SET7
7076  0010         LPN
7077  0002               2
7100  0260         ZJP  T2
7101  7105               SET6
7102  0077         HLT          ** STOP A-REGISTER EQUALS
                                  TWO, TAPE UNIT NOT READ.
                                  CORRECT CONDICTION AND RUN
7103  0264         UJP  T2
7104  7070               SET5
7105  0075  SET6    EXF           ** SELECT TAPE BINARY LOW DENSITY
7106  0013               TAPE3
7107  0011               SOL
7110  0020         LDN
7111  0000  SET7                  ** STORED STATUS OF TAPE NO. 3
7112  0010         LPN
7113  0040               40
7114  0261         NZP  T2
7115  7121               SET8
7116  0075         EXF
7117  0013               TAPE3
```

```
7120  0034                          RWL
7121  0075   SET8          EXF              ** STATUS OF TAPE NO. 3
7122  0013                          TAPE3
7123  0000                          RSO
7124  0076                 INA
7125  0263                 NJP      T2
7126  7121                          SET8
7127  0075                 EXF
7130  0013                          TAPE3
7131  0024                          READ
7132  0372                 INN      T3
7133  7670                          AREA
7134  7770                +100      AREA
7135  0321   SET9          LDM      T3       TEST FOR LAST FILE
7136  7670                          AREA
7137  0034                 SBN
7140  0077                          77
7141  0260                 ZJP      T2
7142  7177                          SET12
7143  0075                 EXF
7144  0013                          TAPE3
7145  0032                          SFF
7146  0255                 RAO      T2
7147  7214                          NUMBER
7150  0235                 SBM      T2
7151  7213                          FILE
7152  0261                 NZP      T2
7153  7121                          SET8
7154  0321                 LDM      T3
7155  7664                          LAST
7156  0261                 NZP      T2
7157  7166                          SET10
7160  0020                 LDN
7161  7541                          LPFT
7162  0241                 STM      T2
7163  7306                          MTLD8
7164  0264                 UJP      T2
7165  7222                          MTLD1
7166  0003   SET10         TTA              ** CLEAR FLAG NO. EOF
7167  0241                 STM      T2
7170  7215                          NOEOF
7171  0020   SET11         LDN              ** STORE ADDRESS FOR JUMP
7172  7410                          DPTT3
7173  0241                 STM      T2
7174  7306                          MTLD8
7175  0264                 UJP      T2
7176  7362                          DPTT
7177  0321   SET12         LDM      T3       ** LOADING OR DUMPING PROGRAM
```

```
7200  7664                      LAST
7201  0261            NZP       T2
7202  7204                      SET13
7203  0077            HLT                 ** STOP A-REGISTER EQUALS
                                             ZERO, FILE CALLED FOR
                                             NOT ON TAPE -- NO RECOVERY
                                             RESTART.
7204  0241  SET13      STM       T2        ** SET FLAG FOR EOF
7205  7215                      NOEOF
7206  0075  SET14      EXF                 ** SEARCH BACK ONE RECORD
7207  0013                      TAPE3
7210  0031                      SBR
7211  0264            UJP       T2
7212  7171                      SET11
7213  0000  FILE                           ** FILE NUMBER LOAD OR DUMP
7214  0000  NUMBER                         ** PROGRAM FILE COUNTER
7215  0000  NOEOF                         ** ZERO NO EOF AFTER DUMP.
```

FORMAT OF INPUT AND OUTPUT FOR PROGRAM MTLD.



CHANNELS 1, 2, 3 AND 4 ARE PART OF AN 8-BIT WORD. CHANNEL 5, IS TO IDENTIFY HIGH ORDER OF THAT WORD.

THERE ARE 102 FRAMES PER RECORD. EXCEPT THE LAST RECORD OF THE FILE, ITS LESS THEN 102 FRAMES, THE CHECKSUM IS STORED IN THE LAST TWO FRAMES OF THAT RECORD. THEN BLANK TAPE BEFORE END OF FILE MARK.

FILE TWO, IS THE LAST FILE ON THIS TAPE. IT IS FOLLOWED BY BLANK TAPE, END OF FILE MARK AND CODE MARK (77) CODE MARK, ALLOWS PROGRAM "SET" TO IDENTIFY THE LAST FILE ON TAPE

N Nicholas

MTLD

I. Function

A. General

Reads or writes in binary and low density on the normal channel, variable length records up to 102 characters. Each character consists of four bits stored in the low order position of the frame.

Checks for parity errors after each record, if the parity occurs five times for the same record, the program will halt and indicate that there was a parity error on the tape.

B. Detail

The routine writes a program or file from 8092B core to the Automatic Load and Dump Tape. The program or file is recorded on the tape as a file of 102 character records (note the last record can be less than 102 characters) the routine leaves about twelve inches of blank tape between files (that is between programs written on the tape). Each file is divided by an end of file mark, except the last file on the tape, it has an end of file mark and a code mark (octal 77). Code mark identifies the last file on the Automatic Load and Dump Tape. After dumping a program or file on the tape, MTLD will come to a halt and display its file number in the A register.

The routine reads a file or program from the Automatic Load and Dump Tape. After each record is read it checks for end of file mark, if file mark is present, the check sum which was built in the program LDFT is compared with the checksum on the tape and displayed in the A-register. If the A-register equals zero, the file was loaded correctly, if other than zero, the file was loaded incorrectly.

II. TAGS

TAG1	Not used.
TAG2	Programs execution tag.
TAG3	Used with the input/output of the records. Exit tag to the programs LPFT and DPTT3.

III. CONTROL WORDS

STOP	Input or output last word address.
AREA	Input or output first word address.
SIZE	Number of characters just inputted.
FLAG	Last record to be dumped for this file.
NOEOF	Control to write file mark and code mark.
CKSOM	Checksum of the file just inputted to the 8092B core.

IV. ENTRY POINT

MTLD	Entry point for the programs SET and DPTT.

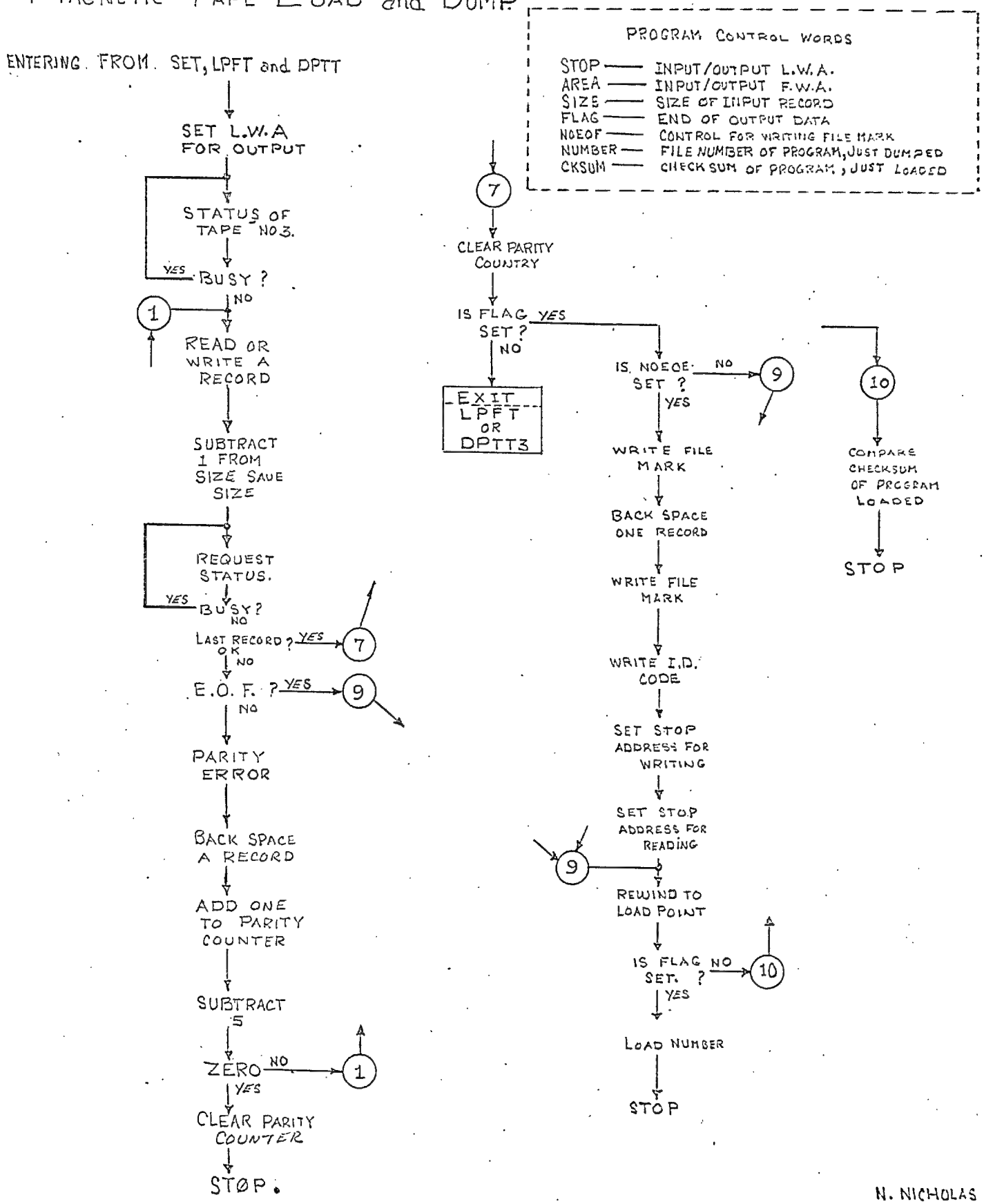
MTLD1 Entry point for the program LPFT.

V. EXITS
To LPFT
To DPTT3

Program Name

MTLD

Magnetic Tape Load and Dump



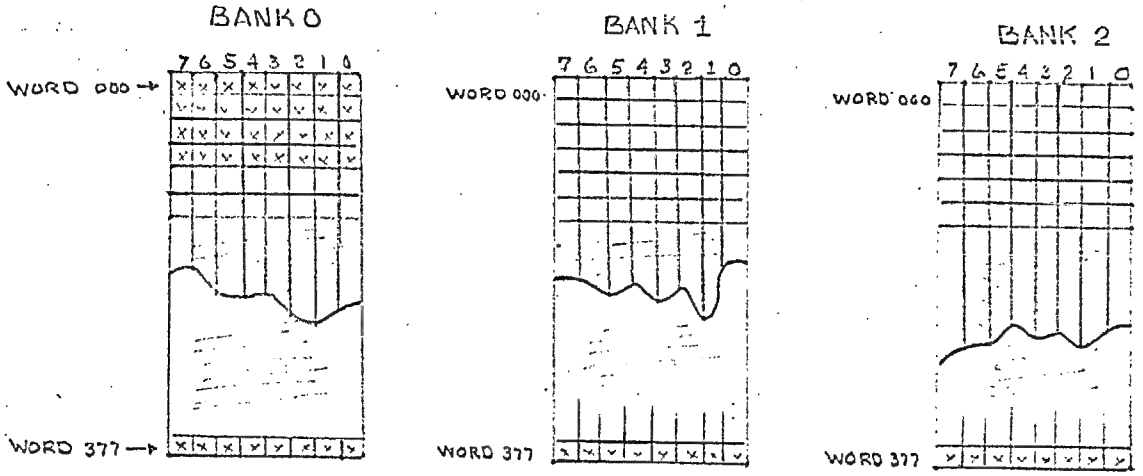
N. NICHOLAS

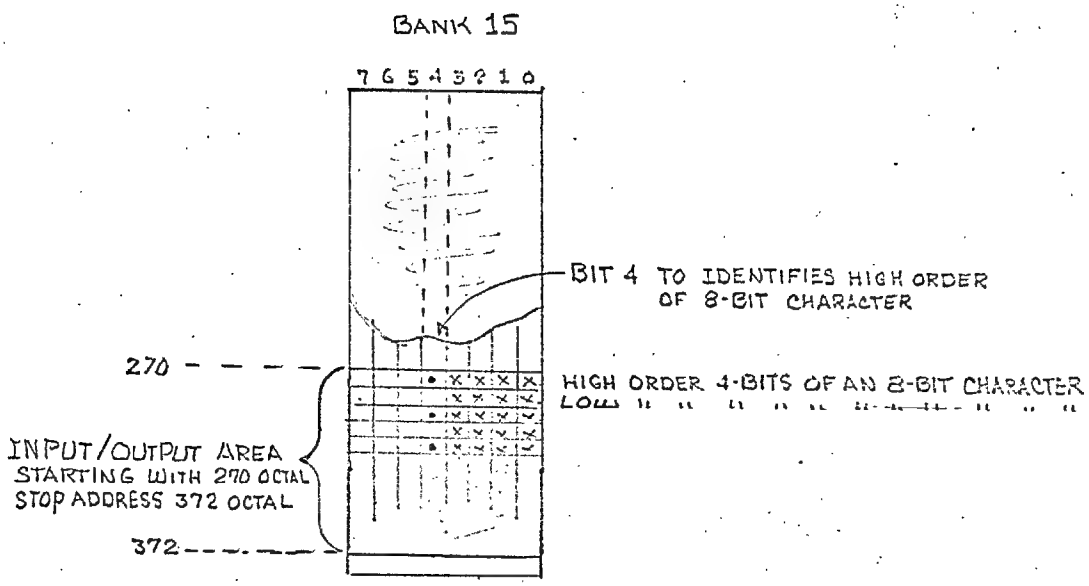
```
                                                  ******************
                                              ******                ******
                                              *     PROGRAM  NAME  MTLD     *
                                              *                             *
                                              * MAGNETIC TAPE LOAD AND DUMP *
                                              *  READS DATA OR WRITES DATA  *
                                              *   TO 601 OR 603 USING 8093  *
                                              *        SYNCHRONIZER         *
                                              ******                ******
                                                  ******************
7216  0321   MTLD        LDM     T3
7217  7666                       STOP
7220  0241               STM     T2
7221  7235                       MTLD4
7222  0075   MTLD1       EXF             ** STATUS OF TAPE UNIT
7223  0013                       TAPE3
7224  0000                       RSO
7225  0076               INA
7226  0263               NJP     T2
7227  7222                       MTLD1
7230  0075               EXF
7231  0013                       TAPE3
7232  0000   MTLD2                       ** STORED CODE, WRITE OR READ
7233  0000   MTLD3                       ** STORED CODE, OUTPUT OR INPUT
7234  7670                       AREA
7235  7776   MTLD4      +106     AREA
7236  0034               SBN
7237  0001                       1
7240  0341               STM     T3
7241  7662                       SIZE
7242  0075   MTLD5       EXF             **CHECK FOR E.O.F. AND PARITY
7243  0013                       TAPE3
7244  0000                       RSO
7245  0076               INA
7246  0263               NJP     T2
7247  7242                       MTLD5
7250  0010               LPN
7251  0024                       24
7252  0260               ZJP     T2
7253  7301                       MTLD7
7254  0034               SBN
7255  0024                       24
7256  0260               ZJP     T2
7257  7331                       MTLD9
7260  0075               EXF
7261  0013                       TAPE3
7262  0031                       SBR
7263  0255               RAO     T2
```

```
7264  7300                        MTLD6
7265  0034              SBN
7266  0005                        5
7267  0261              NZP       T2
7270  7222                        MTLD1
7271  0241              STM       T2
7272  7300                        MTLD6
7273  0020              LDN
7274  0022                        22
7275  0077              HLT                 ** STOP A = 22, PARITY ERROR
                                                IF YOU WISH TO TRY AGAIN,
                                                JUST CONTINUE FROM HERE
7276  0264              UJP       T2
7277  7222                        MTLD1
7300  0000  MTLD6                           ** COUNTER FOR PARITY RETRIES
7301  0241  MTLD7       STM       T2        ** TEST WRITING OR READING
7302  7300                        MTLD6
7303  0321              LDM       T3
7304  7665                        FLAG
7305  0360              ZJP       T3
7306  0000  MTLD8                           ** STORED ADDRESS FROM SET
7307  0221              LDM       T2
7310  7215                        NOEOF
7311  0260              ZJP       T2
7312  7331                        MTLD9
7313  0075              EXF
7314  0013                        TAPE3
7315  0021                        WFM
7316  0075              EXF
7317  0013                        TAPE3
7320  0031                        SBR
7321  0075              EXF
7322  0013                        TAPE3
7323  0021                        WFM
7324  0075              EXF
7325  0013                        TAPE3
7326  0020                        WRT
7327  0074              OTN
7330  0077                        77
7331  0020  MTLD9       LDN       ** RESET F. W. A. AND L. W. A.
7332  7772             +102       AREA
7333  0341              STM       T3
7334  7666                        STOP
7335  0030              ADN
7336  0004                        4
7337  0241              STM       T2
7340  7235                        MTLD4
7341  0075              EXF
```

```
7342  0013                          TAPE3
7343  0034                          RWL
7344  0321                  LDM     T3
7345  7665                          FLAG
7346  0260                  ZJP     T2
7347  7353                          MTLD10
7350  0221                  LDM     T2      ** LOAD PROGRAM FILE NUMBER
7351  7214                          NUMBER
7352  0077                  HLT             ** STOP NEW PROGRAM ON TAPE
                                                A-REGISTER CONTAINTS FILE
                                                NUMBER
7353  0321   MTLD10         LDM     T3      ** CKSUM COMPARE, IF LOADED
7354  7661                          CKSUM      PROPERLY
7355  0135                  SBM     T1
7356  0000                          0
7357  0135                  SBM     T1
7360  0000                          0
7361  0077                  HLT             ** STOP PROGRAM LOADED
                                                CKSUM IN A-REGISTER
                                                ZERO = LOADED O. K.
                                                NON-ZERO = LOADED BAD
7362  0321   DPTT           LDM     T3
7363  7664                          LAST
7364  0034                  SBN
7365  0017                          17
7366  0363                  NJP     T3
7367  7400                          DPTT2
7370  0020                  LDN
7371  0377                          377
7372  0077                  HLT             ** STOP.  A-REGISTER EQUALS
                                                377, PROGRAM FOR DUMPING
                                                IS TO LARGE.  NO RECOVERY.
      7400          PRG             7400
                                                    ******************
                                                *****                  *******
                                                *    PROGRAM NAME  DPTT      *
                                                *                            *
                                                * BREAK UP 8BIT WORDS TO4BIT *
                                                * WORDS,STORE IN OUTPUT AREA *
                                                *         FOR  DUMP          *
                                                *****                  *******
                                                    *******************
7400  0020   DPTT2          LDN             ** SET START ADDRESSES
7401  0000                          0
7402  0341                  STM     T3
7403  7411                          DPTT4
7404  0020                  LDN
7405  0270                          270
```

PROGRAM DPTT.
FORMAT





STARTING WITH THE WORD 000 OF BANK 0. TAKES THE 8-BITS DIVIDES THEM INTO TWO FOUR-BIT WORDS, ADDS BIT-4 TO IDENTIFIE HIGH ORDER 4-BITS OF AN 8-BIT WORD. STORE THEM INTO BANK 15 STARTING WITH ADDRESS 270 OCTAL.

n Nicholas

DPTT

I. Function

A. General

Takes an eight-bit word, checksums the eight bits then divides them into two four-bit words. The four bit words are stored into the INPUT/OUTPUT AREA so the program MTLD can output them onto the Automatic Load and Dump Tape.

B. Detail

The last word address for dumping the 8092B core, is address 377 of the last bank which was indicated for dumping. Starting address of the eight-bit words will always be word zero of bank zero. The eight bit words are checksumed, then divided into two four-bit words and identifies, the high order four bits of the eight-bit word by adding bit 4. Stores the high order word first, starting with the address of 270 octal of bank 15. The storage address is then incremented by one and the low order four-bits of the eight-bit word is stored. Both the store and start addresses are then incremented by one; then the processing of the eight-bit word will start again.

When the INPUT/OUTPUT AREA, (which is bank 15 starting with the word 270 octal as the first word address and 372 octal as the last word address) becomes filled, it releases control to program MTLD.

After the last eight bit word becomes processed the checksum word is then processed in the same manner, and sets a flag to indicate that this will be the last record for this file, then exits, to program MTLD.

Continuation

II. TAGS

TAG1 Used in the loading of the eight-bit words.

TAG2 Exit tag to the program MTLD.

TAG3 Used for storing the four-bit words into the INPUT/OUTPUT AREA, Program execution tag.

III. CONTROL WORDS

LAST The last bank + one for dumping eight-bit words.

99 CKSUM Checksum of the eight bit words just dumped.

BANK To indicate the crossing of a bank.

STOP Last word address + one of the output area.

AREA First word address of the output area.

FLAG The last record to be dumped on this file.

IV. ENTRY POINTS

DPTT Entry point for the program SET.

DPTT3 Entry point for the program MTLD.

V. EXITS TO

MTLD

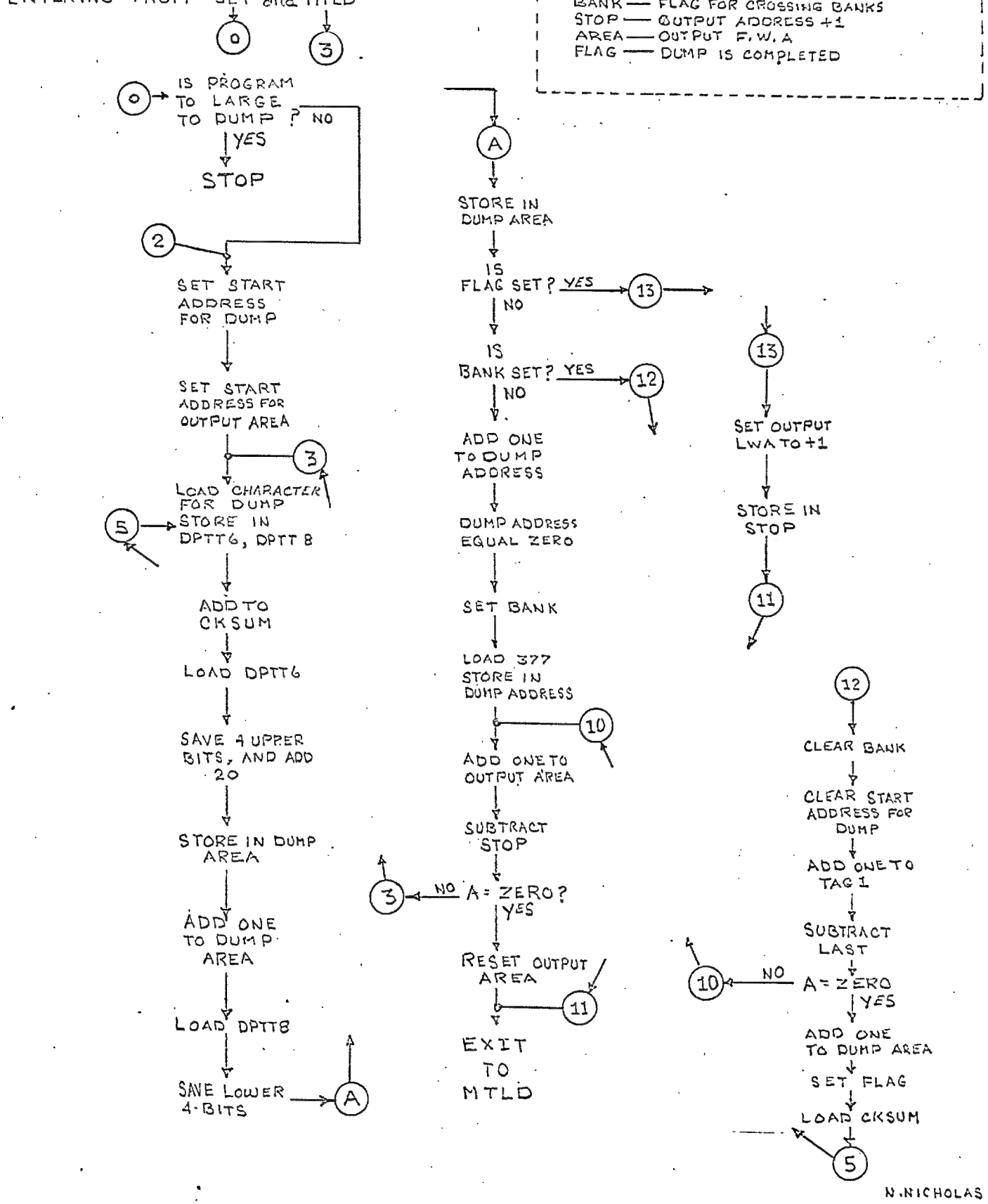
PROGRAM NAME

DPTT

DUMP PROGRAM TO TAPE

PROGRAM CONTROL WORDS

LAST — LAST BANK +1 FOR DUMP
CKSUM — CHECK SUM OF LAST PROGRAM DUMPED
BANK — FLAG FOR CROSSING BANKS
STOP — OUTPUT ADDRESS +1
AREA — OUTPUT F.W.A
FLAG — DUMP IS COMPLETED



N. NICHOLAS

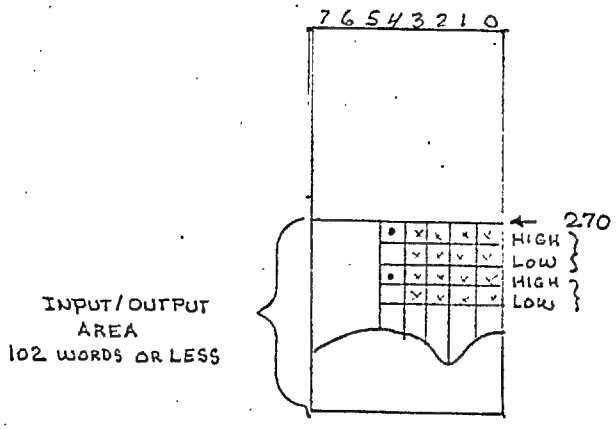
```
7406  0341                STM     T3
7407  7433                        DPTT7
7410  0121  DPTT3          LDM     T1      ** LOAD CHARACTER FOR DUMP
7411  0000  DPTT4                  0       ** DATA START ADDRESS FOR DUMP
7412  0341  DPTT5          STM     T3      ** STORE DATA FORWARD
7413  7421                        DPTT6
7414  0341                STM     T3
7415  7441                        DPTT8
7416  0351                RAM     T3
7417  7661                        CKSUM
7420  0020                LDN
7421  0000  DPTT6                         ** PROCESS HIGH ORDER OF WORD
7422  0010                LPN
7423  0360                        360
7424  0001                SHA
7425  0001                SHA
7426  0001                SHA
7427  0001                SHA
7430  0030                ADN
7431  0020                        20
7432  0341                STM     T3
7433  0270  DPTT7                 270     ** START ADDRESS FOR DUMP
7434  0355                RAO     T3
7435  7433                        DPTT7
7436  0341                STM     T3
7437  7445                        DPTT9
7440  0020                LDN
7441  0000  DPTT8                         ** PROCESS LOW ORDER OF WORD
7442  0010                LPN
7443  0017                        17
7444  0341                STM     T3
7445  0000  DPTT9                 0       ** STORE DATA IN OUTPUT AREA
7446  0321                LDM     T3
7447  7665                        FLAG
7450  0361                NZP     T3
7451  7531                        DPTT13
7452  0321                LDM     T3
7453  7660                        BANK
7454  0361                NZP     T3
7455  7504                        DPTT12
7456  0355                RAO     T3
7457  7411                        DPTT4
7460  0361                NZP     T3
7461  7470                        DPTT10
7462  0355                RAO     T3
7463  7660                        BANK
7464  0020                LDN
7465  0377                        377
```

```
7466  0341                STM     T3
7467  7411                        DPTT4
7470  0355  DPTTIO        RAO     T3      ** INCREASE STORE AREA BY ONE
7471  7433                        DPTT7
7472  0335                SBM     T3
7473  7666                        STOP
7474  0361                NZP     T3
7475  7410                        DPTT3
7476  0020                LDN
7477  7670                        AREA
7500  0341                STM     T3
7501  7433                        DPTT7
7502  0264  DPTTII        UJP     T2      ** EXIT TO PROGRAM MILD
7503  7216                        MTLD
7504  0003  DPTTI2        TTA             ** START OF NEXT BANK
7505  0341                STM     T3
7506  7660                        BANK        BANKS
7507  0341                STM     T3
7510  7411                        DPTT4
7511  0103                TTA     TI
7512  0030                ADN
7513  0001                        1
7514  0102                ATT     TI
7515  0335                SBM     T3
7516  7664                        LAST
7517  0361                NZP     T3
7520  7470                        DPTTIO
7521  0355                RAO     T3
7522  7433                        DPTT7
7523  0355                RAO     T3
7524  7665                        FLAG
7525  0321                LDM     T3
7526  7661                        CKSUM
7527  0364                UJP     T3
7530  7412                        DPTT5
7531  0020  DPTTI3        LDN             ** SET SIZE FOR OUTPUT
7532  0001                        1
7533  0351                RAM     T3
7534  7433                        DPTT7
7535  0341                STM     T3
7536  7666                        STOP
7537  0364                UJP     T3
7540  7502                        DPTTII
```

FORMAT FOR PROGRAM

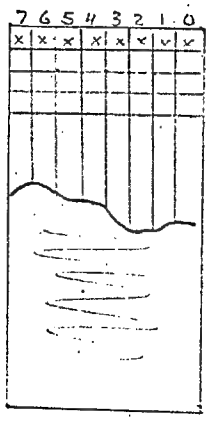
LDFT

BANK 15

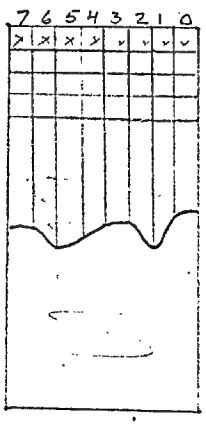


INPUT/OUTPUT AREA BITS 5, 6 AND 7 NOT USED. BIT 4 IDENTIFIES HIGH ORDER BITS. BITS 3, 2, 1 AND 0 ARE THE BITS TO BUILD AN EIGHT BIT WORD.

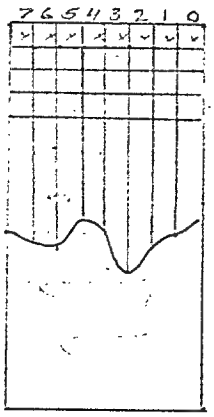
BANK 0



BANK 1



BANK 2



COMBINES THE GROUPS, HIGH AND THE LOW ORDERS OF BITS 3, 2, 1 AND 0 INTO AN EIGHT BIT WORD. BITS 3, 2, 1 AND 0 OF THE HIGH ORDER ARE SHIFTED TO BITS 7, 6, 5, AND 4 OF THE 8-BIT WORD, THEN BITS 3, 2, 1 AND 0 OF THE LOW ORDER ARE COMBINED WITH THE 8-BIT WORD, AND STORED INTO THE 8092 B CORE STARTING WITH WORD ZERO OF BANK ZERO. IT WILL CONTINUE TO COMBINE THE HIGH AND THE LOW, TAKE THE CHECKSUM AND STORES THEM UNTIL THE FILE IS COMPLETED.

N. Nicholas

LDFT

I. Function

A. General

Takes the four-bit input words and assembles them into eight-bit words, checksums the eight-bit words stores them in bank zero starting with word zero. The storage address is incremented for the next eight-bit character. The process is repeated until the program MTLD detects the end of file from the Automatic Load and Dump Tape.

B. Detail

The input words (which are inputted by MTLD) are stored in bank 15 starting with address 270. They are four bit words with identification of the four high order bits for each eight bit word. The high order bits are combined with the corresponding low order bits, in assembling an eight-bit Teleprogrammer word. This eight-bit word is checksumed and then stored into the 8092B core starting with word zero of bank zero. The storage address is then incremented by one. The process will continue until the end of file mark is detected by the program MTLD.

II. TAGS used

TAG1 Used for storing of the eight bit words.

TAG2 Exit tag to the program MTLD1.

TAG3 Used with the input of the four bit words, LDFT execution tag.

III. CONTROL WORDS

HOLD Temporary storage to build the eight bit word.

CKSUM The adding of the bits in an eight-bit word before storing.

BANK Crossing of the banks before storing next eight-bit word.

SIZE The number of characters of the last input record.

AREA The starting address of the input record.

IV. ENTRY POINTS

LDFT Entry point for the program MTLD.

V. EXITS

To MTLD1

PROGRAM NAME

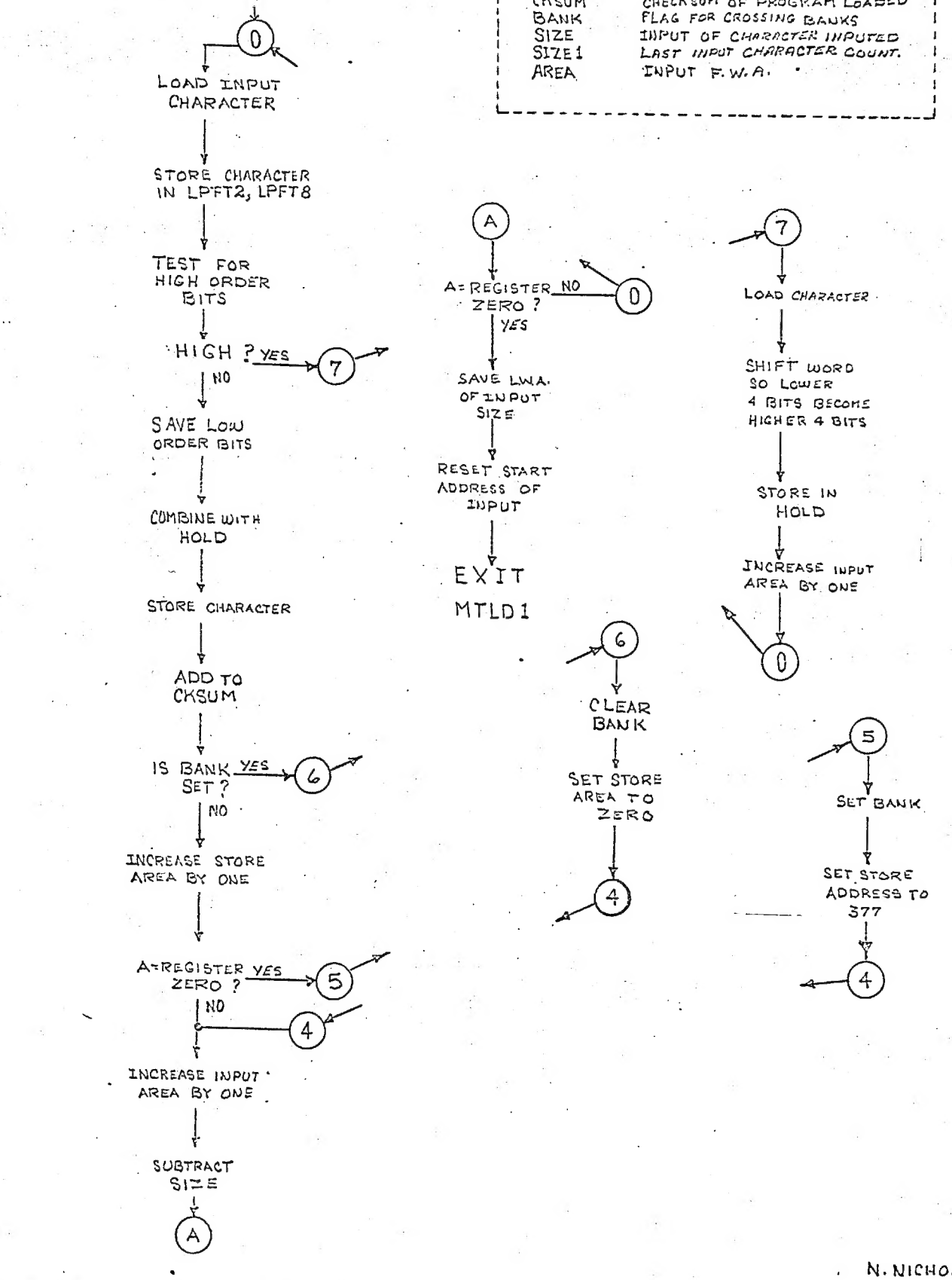
LPFT

LOAD PROGRAM FROM TAPE

ENTERING FROM MTLD

PROGRAM CONTROL WORDS

HOLD	TEMP STORE WORD
CKSUM	CHECKSUM OF PROGRAM LOADED
BANK	FLAG FOR CROSSING BANKS
SIZE	INPUT OF CHARACTER INPUTED
SIZE1	LAST INPUT CHARACTER COUNT.
AREA	INPUT F.W.A.



N. NICHOLAS

```
                                                    ******************
                                                 ******                 *******
                                                 *     PROGRAM NAME  LPFT      *
                                                 *                             *
                                                 * BREAKUP TWO FOUR BIT WORDS *
                                                 * TO MAKE UP ONE 8-BIT  WORD *
                                                 * COMING IN FROM MAGNETIC    *
                                                 *           TAPE              *
                                                 ************    **************
                                                            ****
7541  0321   LPFT        LDM    T3
7542  0270   LPFT1               270    ** FWA OF INPUT DATA
7543  0341               STM    T3
7544  7562                      LPFT2
7545  0341               STM    T3
7546  7641                      LPFT8
7547  0034               SBN
7550  0077                      77
7551  0360               ZJP    T3
7552  7656                      LPFT9
7553  0030               ADN
7554  0077                      77
7555  0010               LPN
7556  0020                      20
7557  0361               NZP    T3
7560  7640                      LPFT7
7561  0020               LDN
7562  0000   LPFT2                      ** LOWER 4-BITS OF CHARACTER
7563  0315               LSM    T3
7564  7657                      HOLD
7565  0141               STM    T1
7566  0000   LPFT3               0      ** STORE ADDRESS FOR DATA
7567  0351               RAM    T3
7570  7661                      CKSUM
7571  0321               LDM    T3
7572  7660                      BANK
7573  0361               NZP    T3
7574  7625                      LPFT6
7575  0355               RAO    T3
7576  7566                      LPFT3
7577  0360               ZJP    T3
7600  7615                      LPFT5
7601  0355   LPFT4       RAO    T3     ** INCREASE FWA BY ONE
7602  7542                      LPFT1
7603  0335               SBM    T3
7604  7662                      SIZE
7605  0361               NZP    T3
7606  7541                      LPFT
```

```
7607  0020            LDN
7610  7670                    AREA
7611  0341            STM     T3
7612  7542                    LPFTI
7613  0264            UJP     T2      ** GO READ NEXT RECORD
7614  7222                    MTLDI
7615  0355  LPFT5      RAO     T3      ** SET SWITCH, CROSSING BANK
7616  7660                    BANK
7617  0020            LDN
7620  0377                    377
7621  0341            STM     T3
7622  7566                    LPFT3
7623  0364            UJP     T3
7624  7601                    LPFT4
7625  0003  LPFT6      TTA             ** SET ADDRESS FOR NEXT BANK
7626  0341            STM     T3          FOR STORING CHARACTERS
7627  7660                    BANK
7630  0341            STM     T3
7631  7566                    LPFT3
7632  0103            TTA     TI
7633  0030            ADN
7634  0001                    1
7635  0102            ATT     TI
7636  0364            UJP     T3
7637  7601                    LPFT4
7640  0020  LPFT7      LDN             ** UPPER 4-BITS OF CHARACTER
7641  0000  LPFT8                      ** PRESTORED CHARACTER
7642  0010            LPN
7643  0017                    17
7644  0001            SHA
7645  0001            SHA
7646  0001            SHA
7647  0001            SHA
7650  0341            STM     T3
7651  7657                    HOLD
7652  0355            RAO     T3
7653  7542                    LPFTI
7654  0364            UJP     T3      ** GET NEXT CHARACTER FOR WORD
7655  7541                    LPFT
7656  0077  LPFT9      HLT             ** JOB FILE CALLED FOR NOT
                                         ON (ALD) TAPE
```

```
7657  0000  HOLD                          ** TEMP STORAGE FOR CHARACTER
7660  0000  BANK                          ** CROSSING OF BANK TEST
7661  0000  CKSUM                         ** CHECKSUM FOR CHARACTERS
7662  0000  SIZE                          ** SIZE OF INPUT RECORD NEW
7663  0000  SIZEI                         ** SIZE OF INPUT RECORD OLD
7664  0000  LAST                          ** LAST BANK TAG FOR DUMP
7665  0000  FLAG                          ** END OF OUTPUT DATA
7666  7772  STOP        +102     AREA     ** INPUT - OUTPUT = STOP ADDRESS
      7670        PRG            7670
7670  0000  AREA                          ** AREA STARTING I/O FWA
      0373  OUTT3  EQU            373      ** OUTPUT SELECT CODE TAG 3
      0372  INNT3  EQU            372      ** INTPUT SELECT CODE TAG 3
```